SHARP® SERVICE MANUAL

S5504R2277H//

COMMERCIAL

MICROWAVE OVEN

MODEL **R-2277**
R-2287

In interests of user-safety the oven should be restored to its original condition and only parts identical to those specified should be used.

TABLE OF CONTENTS

SHARP CORPORATION

CAUTION
MICROWAVE RADIATION

Personnel should not be exposed to the microwave energy which may radiate from the magnetron or other microwave generating devices if it is improperly used or connected.
All input and output microwave connections, waveguides, flanges and gaskets must be secured.
Never operate the device without a microwave energy absorbing load attached.
Never look into an open waveguide or antenna while the device is energized.

VARNING
MICKROVAGSSTRALING

Personal får inte utsättas för mikrovågsenergi som kan ustrala från magnetronen eller andre mikrovågsalstrande anordningar om dessa är felanslutna eller används på fel sätt.
Alla in-och utgångsanslutningar för mikrovågor, vagledare, flänsar och packningar måste vara fast anslutna.
Mikrovågsgeneratorn får inte arbeta utan att absorberande belastning är ansluten. Titta aldrig in i ën öppen vågledare eller antenn när mikrovågsgeneratorn är påkopplad eller laddad.

VAROITUS
MIKROAALTOSÄTELYÄ

Käyttäjä ei saa joutua alttiiksi mikroaaltoenergialle, jota voi säteillä magnetronista tai muusta mikroaaltoja kehittävästä laitteesta, jos sitä käytetään tai jos se kytketään väärin.
Kaikkien mikroaaltoliitäntöjen sekä syöttö-että ulostulopuolella, aaltoputkien laippojen ja tiivisteiden tulee olla varmistettuja.
Mikroaaltouunnia ei koskaan saa käyttää ilman kuormaa jossa mikroaaltoenergiaa kuluu.
Avoimeen aaltoputkeen tai antenniin ei koskaan saa katsoa virran ollessa kytkettynä.

ADVARSEL
MIKROBØLGESTRÅLING

Personell må ikke utsettes for mikrobølge-energi som kan utståles fra magnetronen eller andre mikrobølge-generende deler dersom apparatet feilbetjenes eller blir feiltikoplet.
Alle inn-og ut-tilkoplinger i forbindelse med mikrobølge-strålingen, bølgeledere, flenser og tetningsringer/pakninger må festes ordentlig.
Aldri bruk apparatet med mindre en mikrobålge-absorberende last er plassert i ovnsrommet.
Aldri se direkte inn i en åpen bølgeleder eller antenne imens apparatet er strømførende.

ADVARSEL
MIKROBØLGEBESTRÄLING

Man bør ikke udsætte sig for mikrobølgebestråling fra magnetronen eller andre mikrobølgefrembringende anordninger, hvilket kan ske hvis apparatet er forkert tilsluttet eller bruges forkert. Alle mikrobølgeindgange og-udgange, bølgeledere, flanger og tætningsstrimler må være forsvarligt udført.
Anvend aldrig ovnen uden en mikrobølgesabsorberende anordning. Se aldrig ind i en åben bølgeleder eller antenne, mens ovnen er i brug.

SERVICE MANUAL

SHARP

COMMERCIAL
MICROWAVE OVEN

R-2277 / R-2287

GENERAL IMPORTANT INFORMATION

This Manual has been prepared to provide Sharp Corp. Service engineers with Operation and Service Information.

It is recommended that service engineers carefully study the entire text of this manual, so they will be qualified to render satisfactory customer service.

CAUTION
MICROWAVE RADIATION

DO NOT BECOME EXPOSED TO RADIATION FROM THE MICROWAVE GENERATOR OR OTHER PARTS CONDUCTING MICROWAVE ENERGY.

WARNING

Note:	The parts marked "*" are used in voltage more than 250V. (Parts List)
Anm:	Delar märket med "*" har en spänning överstigande 250V.
Huom:	Huolto-ohjeeseen merkitty "tähdella" osat joissa jännite on yli 250 V.
Bemerk:	Deler som er merket "asterisk" er utsatt for spenninger over 250V til jord.
Bemærk:	"Dele mærket med stjerne benyttes med højere spænding end 250 volt.

WARNING

Never operate the oven until the following points are ensured.
(A) The door is tightly closed.
(B) The door latches and hinges are not defective.
(C) The door is not deformed or warped.
(D) There is not any other visible damage with the oven.

Servicing and repair work must be carried out only by trained service engineers.

Removal of the outer wrap gives occess to potentials above 250V.

All the parts marked "Δ" on the parts list may cause undue microwave exposure, by themselves, or when they are damaged, loosened or removed.

SHARP CORPORATION

OSAKA, JAPAN

PRODUCT DESCRIPTION

SPECIFICATION

ITEM	DESCRIPTION
Power Requirements	230 Volts 50 Hertz Single phase, 3 wire grounded
Power Consumption	2.7 kW Approx. 13A (R-2287) / 2.0kW 9A for R-2277
Power Output	1700 watts (R-2287) /1200 watts (R-2277) nominal of RF microwave energy (Method of IEC 705) Operating frequency of 2450MHz
Outside Dimensions	Width 510mm Height 335 mm Depth 470 mm
Cooking Cavity Dimensions	Width 330 mm Height 180 mm Depth 330 mm
Control Complement	Electronic timer (0 - 30 min.) Microwave Power level 100% 50% 20% 10% MICROWAVE POWER SETTING button START button
Set Weight	Approx. 33kg (R-2287) / Approx. 31kg R-2277)

GENERAL INFORMATION

WARNING

THIS APPLIANCE MUST BE EARTHED

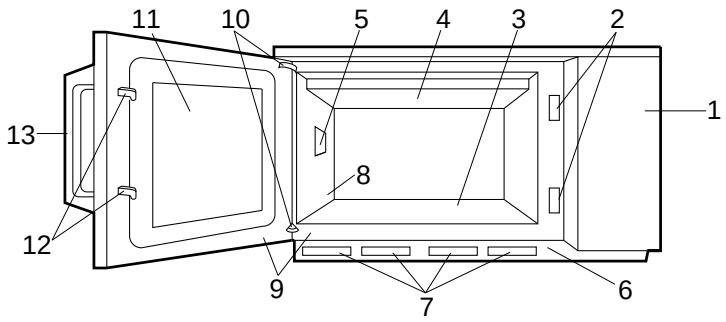
IMPORTANT

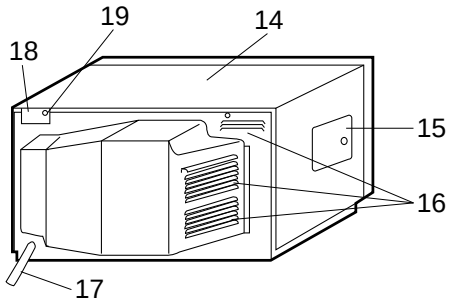
THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

APPEARANCE VIEW

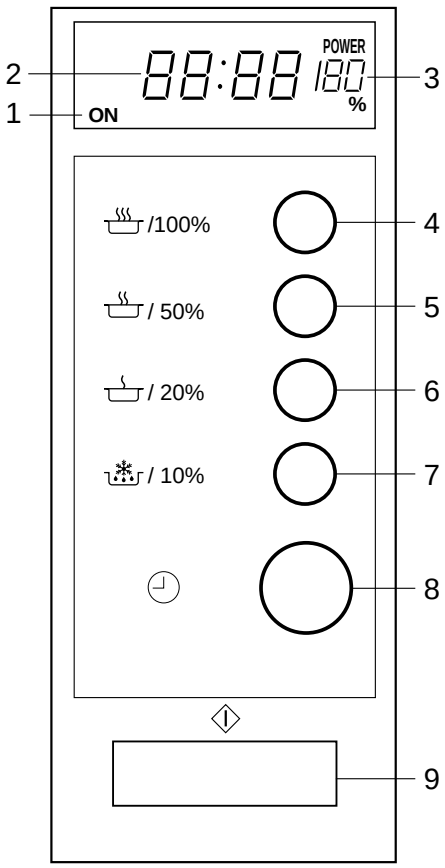
OVEN





1. Control panel
2. Door lock openings
3. Tray
4. Splash cover
5. Oven lamp
6. Air intake filter
7. Air intake openings
8. Oven cavity
9. Door seals and sealing surfaces
10. Door hinges
11. Door
12. Safety door latches
13. Door open handle.
14. Outer cabinet
15. Oven lamp access cover
16. Ventilation openings
17. Power supply cord
18 Mounting plate
19 Screw for mounting plate

CONTROL PANEL



DISPLAY AND INDICATORS

Check indicators after the oven starts to confirm the oven is operating as desired.

1. Cook indicator
   This indicator shows cooking in progress.
2. Digital display
3. Microwave power level indicator

OPERATING KEYS

4. Power 100%
5. Power 50%
6. Power 20%
7. Power 10%

MICROWAVE POWER LEVEL button

8. ELECTRIC TIMER
   Rotate the knob to enter cooking time.
9. START button

OPERATION SEQUENCE

OFF CONDITION

Closing the door activates all door interlock switches (1st latch switch, 2nd latch switch, 3rd latch switch and stop switch)

IMPORTANT
When the oven door is closed, the monitor switch contacts COM-NC must be open. When the microwave oven is plunged in a wall outlet (230 volts, 50Hz), the line voltage is supplied to the point A5+A7 in the control panel.

Figure O-1 on page 30

1. The digital display shows [.]

NOTE: When the door is opened or after cooking, oven lamp, blower motor and stirrer motors work for 1 minute.

MICROWAVE COOKING CONDITION

Enter a desired cooking time with the turning ELECTRIC TIMER knob. And then push START button.

Function sequence Figure O-2 on page 30

CONNECTED COMPONENTS	RELAY
Oven lamp/ Blower motor/ Stirrer motors	RY1
Power transformer T1	RY3
Power transformer T2	RY4

1. The line voltage is supplied to the primary winding of the high voltage transformer. The voltage is converted to about 3.3 volts A.C. output on the filament winding and high voltage of approximately 2000 volts A.C. on the secondary winding.
2. The filament winding voltage (3.3 volts) heats the magnetron filament and the high voltage (2000 volts) is sent to the voltage doubling circuit, where it is doubled to negative voltage of approximately 4000 volts D.C..
3. The 2450 MHz microwave energy produced in the magnetron generates a wave length of 12.24 cm. This energy is channelled through the waveguide (transport channel) into the oven cavity, where the food is placed to be cooked.
4. When the cooking time is up, a signal tone is heard and the relays RY3+RY4 go back to their home position. The circuits to the high voltage transformers T1+T2. The relay RY1 remains and oven lamp, blower motor and stirrer motors work for 1 minute.
5. When the door is opened during a cook cycle, the switches come to the following condition.

		CONDITION	
SWITCH	CONTACT	DURING COOKING	DOOR OPEN (NO COOKING)
1st latch switch	COM-NO	Closed	Open
Monitor switch	COM-NC	Open	Closed
2nd latch switch	COM-NO	Closed	Open
Stop switch	COM-NO	Closed	Open
3rd latch switch	COM-NO	Closed	Open

The circuits to the high voltage transformers T1+T2 are cut off when the 1st latch, 2nd latch, 3rd latch and stop switches SW1+SW2+SW3+SW5 are made open. The blower motor BM, stirrer motors and oven lamp remains on even if the oven door is opened after the cooking cycle has been interrupted, because the relay RY1 stays closed. Shown in the display is the remaining time, but the program is cancelled if the oven is not started within 3 minutes.

6. MONITOR SWITCH CIRCUIT
The monitor switch SW4 is mechanically controlled by oven door, and monitors the operation of the 1st latch switch SW1.

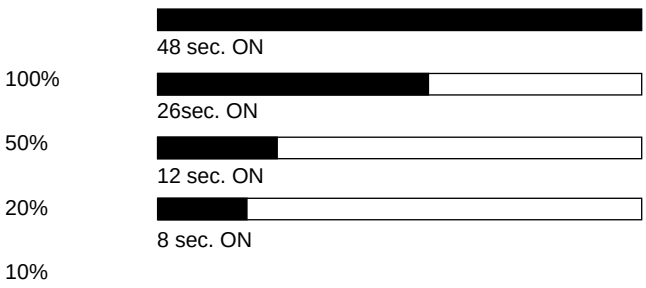
6-1. When the oven door is opened during or after the cycle of a cooking program, the 1st, 2nd, 3rd latch and stop switches SW1+SW2+SW3+SW5 must open their contacts first. After that the contacts (COM-NC) of the monitor switch SW4 can be closed.

6-2. When the oven door is closed, the contacts (COM-NC) of the monitor switch SW4 must be opened first. After that the contacts (COM-NO)of the 1st, 2nd, 3rd latch and stop switches SW1+SW2+SW3+SW5 must be closed.

6-3. When the oven door is opened and the contacts of the 1st latch switch SW1 remain closed, remains closed, the fuse F2 F6.3A will blow, because the monitor switch is closed and a short circuit is caused.

MICROWAVE VARIABLE COOKING

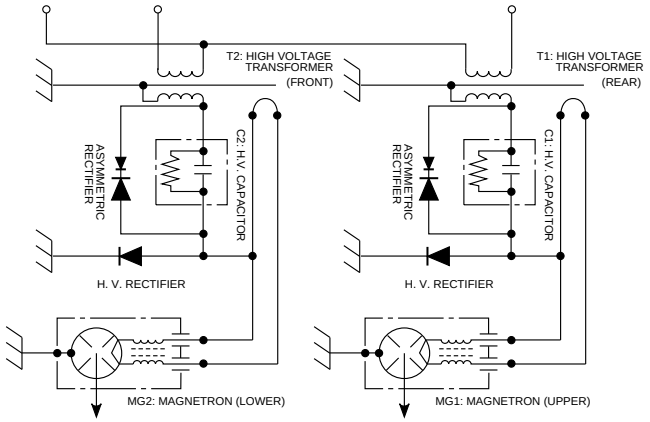
When the microwave oven is preset for variable cooking power, the line voltage is supplied to the high voltage transformers T1+T2 intermittently within a 48 second time base through the contacts of the relays RY3+RY4.
The following levels of microwaves power are given.

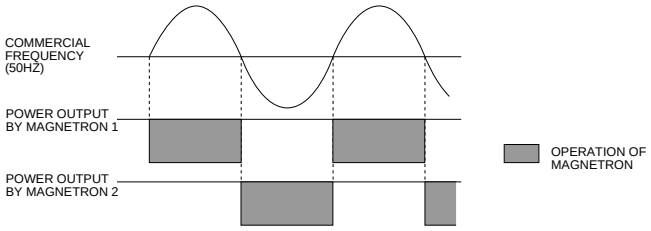


NOTE: The ON/OFF time ratio does not exactly correspond to the percentage of microwave power, because approx. 3 seconds are needed for heating up the magnetron filament.

TWO MAGNETRON OPERATION SYSTEM

Two magnetrons MG1+MG2 are equipped in order to get higher microwave power output. The primary windings of the high voltage transformers T1+T2 are connected so that each





magnetron can be oscillated alternatively according to the frequency of the power supply. Refer to the Figure 1 and 2.

Figure B-1. High Voltage Circuit
Figure B-2. Operation of Magnetron

FUNCTION OF IMPORTANT COMPONENTS

DOOR OPEN MECHANISM

1. The door release lever is pulled.
2. The upper latch head is lifted up by the linked door release lever.
3. The latch lever is lifted up by the door release lever.
4. The joint lever is lifted up by the latch lever.
5. The lower latch head is lifted up by the joint lever.
6. Now both latch heads are lifted up, so they can be released from the latch hook.
7. Now the door can be opened.

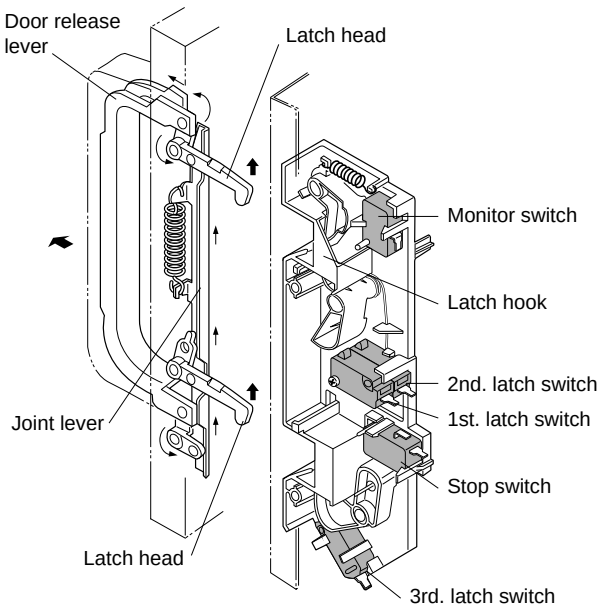


Figure D-1. Door Open Mechanism

1ST LATCH SWITCH SW1, 2ND LATCH SWITCH SW2, 3RD LATCH SWITCH SW3 AND STOP SWITCH SW5

1. When the oven door is closed, the contacts COM-NO must be closed.
2. When the oven door is opened, the contacts COM-NO must be opened.

MONITOR SWITCH SW4

The monitor switch is activated (the contacts opened) the upper latch head and switch lever A while the door is closed. The switch is intended to render the oven inoperative by means of blowing the fuse F2 F6.3A when the contacts of the 1st latch switch SW1 fail to open when the door is opened.

Function

1. When the door is opened, the monitor switch SW4 contacts close (to the ON condition) due to their being normally closed. At this time the 1st latch switch SW1 is in the OFF condition (contacts open) due to their being normally open contact switches.
2. As the door goes to a closed position, the monitor switch contacts are opened and 1st latch switch contacts are closed (On opening the door, each of these switches operate inversely.)
3. If the door is opened and the 1st latch switch contacts fail to open, the fuse F2 F6.3A blows simultaneously with closing of the monitor switch contacts.

CAUTION: BEFORE REPLACING A BLOWN FUSE F2 F6.3A TEST THE 1ST LATCH SWITCH, MONITOR SWITCH AND MONITOR RESISTOR FOR PROPER OPERATION. (REFER TO CHAPTER “TEST PROCEDURE”).

MONITOR RESISTOR R1

The monitor resistor prevents the fuse F2 F6.3A 250V bursting when the fuse F2 F6.3A 250V blows due to the operation of the monitor switch.

NOISE FILTER

The noise filter assembly prevents radio frequency interference that might flow back in the power circuit.

WEAK POINT (R-2287)/ FUSE (R-2277) F1

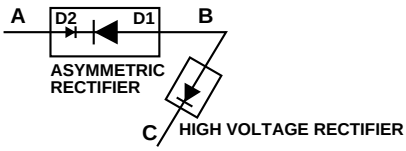
If the wire harness or electrical components make a short-circuit, this weak point/ Fuse F1 blows to prevent an electric shock or fire hazard.

FUSE F6.3A 250V F2

1. If the wire harness or electrical components are short-circuited, this fuse blows to prevent an electric shock or fire hazard.
2. The fuse also blows when 1st latch switch SW1 remains closed with the oven door open and when the monitor switch SW4 closes.

ASYMMETRIC RECTIFIER

The asymmetric rectifier is solid state device that prevents current flow is both directions. And it prevents the temperature rise of the high voltage transformer by blowing the weak point / fuse WP1 or WP2 when the high voltage rectifier is shorted.



The rated peak reverse voltage of D1 of the asymmetric rectifier is 6 KV The rated peak reverse voltage of D2 of the asymmetric rectifier is 1.7 KV. D1 and D2 of the asymmetric rectifier or high voltage rectifier are shorted when the each peak reverse voltage goes beyond the each rated peak reverse voltage. (The process of the blowing the weak point / fuse WP1 or WP2)

1. The high voltage rectifier is shorted by some fault when microwave cooking.
2. The peak reverse voltage of D2 of the rectifier goes beyond the rated peak reverse voltage 1.7 KV in the voltage doubler circuit.
3. D2 of the rectifier is shorted.
4. The large electric currents flow through the high voltage winding of the high voltage transformer.
5. The large electric currents flow through the primary winding of the high voltage transformer.
6. The weak point/ fuse WP1 or WP2 blows by the large electric currents.
7. The power supplying to the high voltage transformer is cut off.

EXHAUST THERMISTOR

The thermistor is a negative temperature coefficient type. The temperature in the exhaust duct is detected through the resistance of the thermistor.

If the temperature is high, the control panel will display “EE7” and the oven will stop to avoid overheating and catching fire.

If the thermistor is open, the control panel will display "EE6" and the oven will stop.

INTAKE THERMISTOR

This thermistor detects ambient air temperature.

MAGNETRON THERMISTOR

The air temperature around the lower magnetron is detected through the resistance of the thermistor.

If the temperature is high, the control panel will display "EE17" and the oven will stop to protect the lower magnetron against overheat.

If the thermistor is open, the control panel will display "EE16" and the oven will stop.

MAGNETRON THERMAL CUT-OUTS 145˚ TC1, TC2

These thermal cut-outs protect the magnetrons against overheat. If their temperature go up higher than 145˚C because the blower motor is interrupted, the ventilation openings are blocked, the thermal cut-outs TC1+TC2 will open and the line voltage to the high voltage transformer T1+T2 will be cut off and the operations of the magnetrons MG1+MG2 will be stopped. The defective thermal cut-out must be replaced with new rated one.

BLOWER MOTOR THERMAL CUT-OUT 115˚C TC3

This thermal cut-out protect the blower motor against overheat. If its temperature goes up higher than 115˚C because the blower motor is locked or the ventilation openings are blocked, the contacts of the thermal cut-out TC3 will open and the line voltage to the control unit will be cut off and the operation of the oven will be stopped. The defective thermal cut-out must be replaced with new rated one.

OVEN THERMAL CUT-OUT 115˚C TC4

This thermal cut-out protects the oven against overheat. If the temperature goes up higher than 115˚C because the food catches fire, the contacts of thermal cut-out will open and the line voltage to the control unit will be cut off and the operation of the oven will be stopped. The defective thermal cut-out must be replaced with a new rated one.

BLOWER MOTOR BM

The blower motor drives a blade which draws external cool air. This cool air is directed through the air vanes surrounding the magnetrons and cools the magnetrons. This air is channelled through the oven cavity to remove steam and vapours given off from the heating foods. It is then exhausted through the exhausting air vents at the oven cavity.

STIRRER MOTOR SM

The stirrer motor drives a stirrer antenna to stir the microwave radiation from the waveguide.

SERVICING

WARNING TO SERVICE PERSONNEL

Microwave ovens contain circuitry capable of producing very high voltage and current. Contact with following parts will result in electrocution.
High voltage capacitor, High voltage transformer, Magnetron, High voltage rectifier assembly, High voltage harness.

REMEMBER TO CHECK 3D

1) Disconnect the supply.
2) Door opened, and wedged open.
3) Discharge high voltage capacitor.

WARNING AGAINST THE CHARGE OF THE HIGH-VOLTAGE CAPACITOR

The high-voltage capacitor remains charged about 60 seconds after the oven has been switched off. Wait for 60 seconds and then short-circuit the connection of the high-voltage capacitor (that is, of the connecting lead of the high-voltage rectifier) against the chassis with the use of an insulated screwdriver.

Sharp recommend that wherever possible fault-finding is carried out with the supply disconnected. It may in, some cases, be necessary to connect the supply after the outer case has been removed, in this event carry out 3D checks and then disconnect the leads to the primary of the high voltage transformer. Ensure that these leads remain isolated from other components and the oven chassis. (Use insulation tape if necessary.) When the testing is completed carry out 3D checks and reconnect the leads to the primary of the high voltage transformer.

REMEMBER TO CHECK 4R

1) Reconnect all leads removed from components during testing.
2) Replace the outer case (cabinet).
3) Reconnect the supply.
4) Run the oven. Check all functions.

Microwave ovens should not be run empty. To test for the presence of microwave energy within a cavity, place a cup of cold water on the oven tray, close the door and set the microwave cooking time for one (1) minute. Set the power level to 100% and push the START button. When the one minutes has elapsed (timer at zero) carefully check that the water is now hot. If the water remains cold carry out 3D checks and re-examine the connections to the component being tested.

When all service work is completed, and the oven is fully assembled, the microwave power output should be checked and microwave leakage test carried out.

TROUBLESHOOTING GUIDE

When troubleshooting the microwave oven, it is helpful to follow the Sequence of Operation in performing the checks. Many of the possible causes of trouble will require that a specific test be performed. These tests are given a procedure letter which will be found in the “Test Procedure”section.

IMPORTANT: If the oven becomes inoperative because of a blown fuse F2 F6.3A in the 1st latch switch - monitor switch - monitor resisitor circuit, check the 1st latch switch, monitor switch and monitor resistor before re-placing the fuse F2 F6.3A

TEST PROCEDURE		A	A	B	B	C	C	C	D	D	E	E	E	E	E	F	F	G	H
POSSIBLE CAUSE AND DEFECTIVE PARTS		MAGNETRON MG1	MAGNETRON MG2	HIGH VOLTAGE TRANSFORMER T1	HIGH VOLTAGE TRANSFORMER T2	H.V. RECTIFIER ASSEMBLY FOR MG1	H.V. RECTIFIER ASSEMBLY FOR MG2	H.V. WIRE HARNESS	H.V. CAPACITOR C1	H.V. CAPACITOR C2	1ST. LATCH SWITCH SW1	2ND. LATCH SWITCH SW2	3RD. LATCH SWITCH SW3	MONITOR SWITCH SW4	STOP SWITCH SW5	WEAK POINT A018 / FUSE M6.3A WP1	WEAK POINT A018 / FUSE M6.3A WP2	WEAK POINT A017 / FUSE 13A F1	FUSE F6.3A F2
CONDITION	PPROBLEM																		
OFF CONDITION	" . " does not appear on display when power cord is plugged into wall outlet.																	○	○
	Control panel can not accept key in.														○				
	Fuse F2 F6.3A blows when the door is opened.										○								
	Home fuse blowns when power cord is plugged into wall outlet.																		
	Weak point/ fuse F1 blowns when power cord is plugged into wall outlet.																		
	Oven lamp, fan motor and stirrer motor do not work for 1 minute whenever the door is opened or after cooking.																		
	Fuse F2 F6.3A blowns when power cord is plugged into wall outlet.													○					
	Oven lamp does not light when door is opened. (Blower and stirrer motors work)																		
	Blower motor does not work when door is opened. (Oven lamp lights and stirrer motors work)																		
ON CONDITION	"EE 1" appear in display	○		○		○		○	○							○			
	"EE 2" appear in display		○		○		○	○		○							○		
	"EE 3" appear in display	○	○	○	○	○	○	○	○	○	○	○	○			○	○		
	"EE 6" appear in display																		
	"EE 7" appear in display																		
	"EE 9" appear in display																		
	Oven lamp, blower motor and stirrer motor do not work.																		
	Oven lamp does not work.																		
	Blower motor does not work.																		
	Oven does not stop after end of cooking cycle. (Oven lamp, blower motor and stirrer motor stop)																		
	Home fuse blows when starting the oven.																		
	Oven goes into cook cycle but shuts down before end of cooking cycle.																		
	Oven seems to be operating but no heat is produced in oven load. (Microwave power level is set at 10%.)	○	○	○	○	○	○	○	○	○	○	○	○			○	○		
	It passed more than 1 minute after cooking but oven lamp, blower motor and stirrer motor do not stop.																		
	"EE 0" appear in display																		
	"EE 16" appear in display																		
	"EE 17" appear in display																		
	"EE 8" appear in display																		
	"EE 10" appear in display																		
	Stirrer motor does not work																		

I MAGNETRON THERMAL CUT-OUT 145˚C TC1	I MAGNETRON THERMAL CUT-OUT 145˚C TC2	I B. MOTOR THERMAL CUT-OUT 115˚C TC3	I OVEN THERMAL CUT-OUTT 115˚C TC4	J MONITOR RESISTOR R1	L STIRRER MOTOR	K MAGNETRON THERMISTOR	K EXHAUST THERMISTOR	K INTAKE THERMISTOR	OVEN LAMP OR SOCKET	L BLOWER MOTOR	M NOISE FILTER	POWER SUPPLY CORD	FUSE HOLDER	SHORTED WIRE HARNESS	OPENED WIRE HARNESS	N CONTROL PANEL	P RELAY RY-1, RY-3, RY-4	Q FOIL PATTERN	BLOCKED VENTILATION OPENINGS	BLOCKED BLOWER MOTOR	MIS ADJUSTMENT OF SWITCHES	HOME FUSE OR BREAKER	NO POWER AT WALL OUTLET	OVER THE MAX. COOKING TIME	DUE TO PROGRAMME LOCK	TEMPERATURE OF EXHAUST THERMISTOR IS HIGH	TEMPERATURE OF INTAKE THERMISTOR IS HIGH	TEMPERATURE OF MAGNETRON THERMISTOR IS HIGH	BLOCKED STIRRER ANTENNA	O SWITCH UNIT
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TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

A **MAGNETRON TEST**

NEVER TOUCH ANY PART IN THE CIRCUIT WITH YOUR HAND OR AN INSULATED TOOL WHILE THE OVEN IS IN OPERATION.

CARRY OUT 3D CHECK.
Isolate the magnetron from high voltage circuit by removing all leads connected to filament terminal.

To test for an open circuit filament use an ohmmeter to make a continuity test between the magnetron filament terminals, the meter should show a reading of less than 1 ohm.
To test for short filament to anode condition, connect ohmmeter between one of the filament terminals and the case of the magnetron (ground). This test should be indicated an infinite resistance. If a low or zero resistance reading is obtained then the magnetron should be replaced.

MICROWAVE OUTPUT POWER (IEC-705-1988)
The following test procedure should be carried out with the microwave oven in a fully assembled condition (outer case fitted). Microwave output power from the magnetron can be measured by way of IEC 705, i.e. It is measured by how much power the water load can absorb. To measure the microwave output power in the microwave oven, the relation of calorie and watt is used. When P(W) heating works for t(second), approximately P x t/4.187 calorie is generated. On the other hand, if the temperature of the water with V(ml) rises ΔT (°C) during this microwave heating period, the calorie of the water is V x ΔT.

The formula is as follows;
P x t / 4.187 = V x Δ T P (W) = 4.187 x V x ΔT / t
Our condition for water load is as follows:
Room temperature ..... around 20°C Power supply Voltage ..... Rated voltage
Water load..... 1000 g Initial temperature10±2°C
Heating time (R-2287)..... 25 sec. P=170xΔT ((R-2287)
Heating time (R-2277)..... 35 sec. P=120xΔT (R-2277)

Measuring condition:
1. Container
   The water container must be a cylindrical borosilicate glass vessel having a maximum material thickness of 3 mm and an outside diameter of approximately 190 mm.
2. Temperature of the oven and vessel
   The oven and the empty vessel are at ambient temperature prior to the start the test.
3. Temperature of the water
   The initial temperature of the water is (10±2)°C.
4. Select the initial and final water temperature so that the maximum difference between the final water temperature and the ambient temperature is 5K.
5. Select stirring devices and measuring instruments in order to minimize addition or removal of heat.
6. The graduation of the thermometer must be scaled by 0.1°C at minimum and can be accurate thermometer.
7. The water load must be (1000±5) g.
8. “t” is measured while the microwave generator is operating at full power. Magnetron filament heat-up time is not included.

NOTE: The operation time of the microwave oven is “t + 3” sec. (3 sec. is magnetron filament heat-up time.) Therefore total reheating time = 28 seconds (for R-2287) and 38 seconds (for R-2277).

Measuring method:
1. Measure the initial temperature of the water before the water is added to the vessel.
   (Example: The initial temperature T1 = 11°C)
2. Add the 1 litre water to the vessel.
3. Place the load on the centre of the shelf.
4. Operate the microwave oven at HIGH for the temperature of the water rises by a value Δ T of (10 ± 2) K.

TEST PROCEDURES

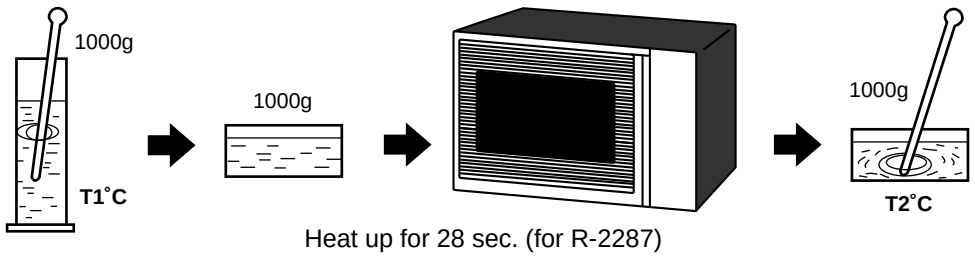
PROCEDURE LETTER	COMPONENT TEST

5. Stir the water to equalize temperature throughout the vessel.
6. Measure the final water temperature. (Example: The final temperature T2 = 21°C)
7. Calculate the microwave power output P in watts from above formula.

Initial temperature ..... T1 = 11°C
Temperature after (25 + 3) = 28 sec (for R-2287) ..... T2 = 21°C
Temperature after (35 + 3) = 38 sec (for R-2277) ..... T2 = 21°C
Temperature difference Cold-Warm ..... ΔT = 10°C
Measured output power
The equation is "P = 170 x ΔT" for R-2287 ..... P = 170 x 10°C = 1700 Watts
The equation is "P = 120 x ΔT" for R-2277 ..... P = 120 x 10°C = 1200 Watts

JUDGMENT: The measured output power should be at least ± 15 % of the rated output power.

CAUTION: 1°C CORRESPONDS TO 170 WATTS (FOR R-2287) / 120 WATTS (FOR R-2277).
REPEAT MEASUREMENT IF THE POWER IS INSUFFICIENT.



Heat up for 28 sec. (for R-2287)
Heat up for 38 sec. (for R-2277)

B HIGH VOLTAGE TRANSFORMER TEST

WARNING: High voltages and large currents are present at the secondary winding and filament winding of high voltage transformer. It is very dangerous to work near this part when the oven is on. NEVER make any voltage measurements of the high-voltage circuits, including the magnetron filament.

CARRY OUT 3D CHECKS.
Disconnect the leads to the primary winding of the high voltage transformer. Disconnect the filament and secondary winding connections from the rest of the HV circuitry. Using an ohmmeter, set on a low range, it is possible to check the continuity of all three windings. The following readings should be obtained:

a. Primary winding	approx. 1.06 Ω (R-2287)/ approx. 2 Ω (R-2277)
b. Secondary winding	approx. 57.3 Ω (R-2287)/ approx. 83 Ω (R-2277)
c. Filament winding	less than 1 Ω

If the reading obtained are not stated as above, then the high voltage transformer is probably faulty and should be replaced.
CARRY OUT 4R CHECKS.

C HIGH VOLTAGE RECTIFIER ASSEMBLY TEST

HIGH VOLTAGE RECTIFIER TEST

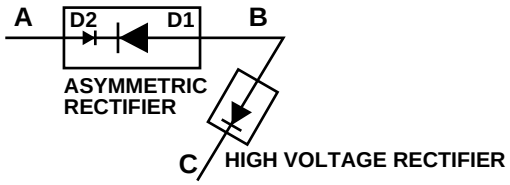
CARRY OUT 3D CHECKS.
Isolate the high voltage rectifier assembly from the HV circuit. The high voltage rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminal B+C of the high voltage rectifier and note the reading obtained. Reverse the meter leads and note this second reading.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

The normal resistance is infinity in one direction and more than 100 kΩ in the other direction.

CARRY OUT 4R CHECKS.



ASYMMETRIC RECTIFIER TEST

CARRY OUT 3D CHECKS.

Isolate the high voltage rectifier assembly from the HV circuit. The asymmetric rectifier can be tested using an ohmmeter set to its highest range. Contact the ohmmeter across the terminals A+B of the asymmetric rectifier and note the reading obtained. Reverse the meter leads and note this second reading. If an open circuit is indicated in both directions then the asymmetric rectifier is good. If an asymmetric rectifier is shorted in either direction, then the asymmetric rectifier is probably faulty and must be replaced with high voltage rectifier. When the asymmetric rectifier is defective, check whether magnetron, high voltage rectifier, high voltage wire or filament winding of the high voltage transformer is shorted.

CARRY OUT 4R CHECKS.

NOTE: FOR MEASUREMENT OF THE RESISTANCE OF THE RECTIFIER, THE BATTERIES OF THE MEASURING INSTRUMENT MUST HAVE A VOLTAGE AT LEAST 6 VOLTS, BECAUSE OTHERWISE AN INFINITE RESISTANCE MIGHT BE SHOWN IN BOTH DIRECTIONS.

D HIGH VOLTAGE CAPACITOR TEST

CARRY OUT 3D CHECKS.

A. Isolate the high voltage capacitor from the circuit.
B. Continuity check must be carried out with measuring instrument which is set to the highest resistance range.
C. A normal capacitor shows continuity for a short time (kick) and then a resistance of about 10MΩ after it has been charged.
D. A short-circuited capacitor shows continuity all the time.
E. An open capacitor constantly shows a resistance about 10 MΩ because of its internal 10MΩ resistance.
F. When the internal wire is opened in the high voltage capacitor shows an infinite resistance.
G. The resistance across all the terminals and the chassis must be infinite when the capacitor is normal.

If incorrect reading are obtained, the high voltage capacitor must be replaced.

CARRY OUT 4R CHECKS.

E SWITCH TEST

CARRY OUT 3D CHECK.

SIsolate the switch to be tested and using an ohmmeter check between the terminals as described in the following table.

Table: Terminal Connection of Switch

Plunger Operation	COM to NO	COM to NC
Released	O.C.	S.C.
Depressed	S.C.	O.C.

COM; Common terminal
NO; Normally open terminal
NC; Normally close terminal
S.C.; Short circuit
O.C.; Open circuit

If incorrect readings are obtained, make the necessary switch adjustment or replace the switch.

CARRY OUT 4R CHECKS.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

F **WEAK POINT A018 / FUSE M6.3A (WP1 OR WP2) TEST**

CARRY OUT 3D CHECKS.

If the weak point/ fuse WP1 or WP2 is blown, there could be a short in the asymmetric rectifier or there is a ground in wire harness. A short in the asymmetric rectifier may have occured due to short or ground in H.V. rectifier, magnetron, high voltage transformer or H.V. wire. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS.

CAUTION: Only replace weak point/ fuse with the correct value replacement. Type A018 is for R-2287. Type M6.3A is for R-2277.

G **WEAK POINT A017/ FUSE 13A (F1) TEST**

CARRY OUT 3D CHECKS.

If the weak point/ fuse F1 is blown, there could be a shorts or grounds in electrical parts or wire harness.
Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS

CAUTION: Only replace weak point/ fuse with the correct value replacement. Type A017 is for R-2287. Type13A is for R-2277.

H **FUSE F6.3A (F2) TEST**

CARRY OUT 3D CHECKS.

If the fuse F2 F6.3A is blown when the door is opened, check the latch switch, monitor switch and monitor resistor.
If the fuse F2 F6.3 is blown by incorrect door switching replace the defective switch(s) and the fuse F2 F6.3A.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuse with the correct value replacement.

I **TTHERMAL CUT-OUT TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the terminals of the thermal cut-out. Then using an ohmmeter, make a continuity test across the each two terminals as described in the table below.

CARRY OUT 4R CHECKS.

Table: Thermal Cut-out Test

Parts Name	Temperature of "ON" condition (closed circuit). (˚C)	Temperature of "OFF" condition (open circuit).	Indication of ohmmeter (When room temperature (˚C) is approx. 20˚C.)
Thermal cut-out 145˚C	This is not resetable type.	Above 145˚C	Closed circuit.
Thermal cut-out 115˚C	This is not resetable type.	Above 115˚C	Closed circuit

If incorrect readings are obtained, replace the thermal cut-out.

An open circuit oven thermal cut-out 115˚C indicates that the oven cavity has over heated, this may be due to no load operation.

An open circuit magnetron thermal cut-out 145˚C indicates that the magnetron has overheated, this may be due to resistricted ventilation, cooling fan failure or a fault condition within the magnetron or HV circuit.

An open circuit blower motor thermal cut-out 115˚C indicates the blower motor winding has overheated, this may be due to resisted ventilation or locked cooling fan.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

J **MONITOR RESISTOR TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the monitor resistor. Using an ohmmeter and set on a low range. Check between the terminals of the monitor resistor.

The resistance of monitor resistor should be read approx. 4.3Ω.

If incorrect readings are obtained, replace the monitor resistor.

CARRY OUT 4R CHECKS.

K **MAGNETRON THERMISTOR TEST**

CARRY OUT 3D CHECKS.
Disconnect connector-H from the CPU unit. Measure the resistance of the thermistor with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

Room Temp.	Resistance
15˚C	Approx. 15.91 kΩ
20˚C	Approx. 13.04 kΩ
25˚C	Approx. 10.74 kΩ

If the meter does not indicate above resistance, replace the thermistor.

CARRY OUT 4R CHECKS.

EXHAUST THERMISTOR TEST

CARRY OUT 3D CHECKS.

Disconnect connector-B from the CPU unit. Measure the resistance of the thermistor with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

Room Temp.	Resistance
15˚C	Approx. 77.45 kΩ
20˚C	Approx. 61.47 kΩ
25˚C	Approx. 49.12 kΩ

If the meter does not indicate above resistance, replace the thermistor.

CARRY OUT 4R CHECKS.

INTAKE THERMISTOR TEST

CARRY OUT 3D CHECKS.

Disconnect connector-D from the CPU unit. Measure the resistance of the thermistor with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

Room Temp.	Resistance
15˚C	Approx. 15.88 kΩ
20˚C	Approx. 13.03 kΩ
25˚C	Approx. 10.74 kΩ

If the meter does not indicate above resistance, replace the thermistor.

CARRY OUT 4R CHECKS.

L **MOTOR WINDING TEST**

CARRY OUT 3D CHECKS.
Disconnect the leads from the motor. Using an ohmmeter, check the resistance between the two terminals.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

Resistance of Blower motor should be approximately 52Ω.
Resistance of Stirrer motor should be approximately 8.8 kΩ.

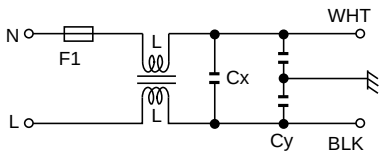
If incorrect readings are obtained, replace the motor.

CARRY OUT 4R CHECKS.

M NOISE FILTER TEST

CARRY OUT 3D CHECKS.

Disconnect the leads from the terminals of noise filter. Using an ohmmeter, check between the terminals as described in the following table.



L (min)	Cx ± 20%	Cy ± 20%
0.5mH	0.22 μF	4700 pF

MEASURING POINT	INDICATION OF OHMMETER
Between N and L	Open circuit
Between terminal N and WHITW	Short circuit
Between terminal L and BLK	Short circuit

If incorrect readings are absorbed, replace the noise filter.

CARRY OUT 4R CHECKS

N CONTROL PANEL ASSEMBLY TEST

The touch control panel consists of circuits including semiconductors such as LSI etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into two units, Control Unit and Switch Unit, troubleshooting by unit replacement is described according to the symptoms indicated.

1. Switch Unit
   The following symptoms indicate a defective switch unit. Replace the switch unit.
   a) When touching the select buttons, a certain button produces no signal at all.
   b) When touching the select buttons, sometimes a button produces no signal.
2. Control Unit
   The following symptoms may indicate a defective control unit. Replacing the control unit.

2-1 Programming problems.
   a) When touching the select buttons, a certain group of buttons do not produce a signal.

2-2 Display problems.
   a) For a certain digit, all or some segments do not light up.
   b) For a certain digit, brightness is low.
   c) Only one indicator does not light.
   d) The corresponding segments of all digits do not light up; or they continue to light up.
   e) Wrong figure appears.
   f) A certain group of indicators do not light up.
   g) The figure of all digits flicker.

2-3 Other possible problems caused by defective control unit.
   a) Buzzer does not sound or continues to sound.
   b) Cooking is not possible.

Note: When defective components, (the Control Unit or Switch Unit) are replaed, the defective part or parts must be properly packed for return in the shipping carton. with its cushion material, in which the new replacement part was shipped to you.

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

O **SWITCH UNIT TEST**

1. CARRY OUT 3D CHECKS.
2. Remove the switch unit from the control panel, referring to control panel removal.
3. To test the switches (SW1-SW5) on the switch unit, check between the terminals of the connector CN-F as described in the following table by using ohmmeter when the switches are released and depressed.

Switches	Terminals	Released	Depressed
SW1	F1 - F4	O.C.	S.C.
SW2	F1 - F5	O.C.	S.C.
SW3	F2 - F4	O.C.	S.C.
SW4	F2 - F5	O.C.	S.C.
SW5	F3 - F4	O.C.	S.C.

O.C. : Open Circuit
S.C. : Short Circuit

P **RELAY TEST**

CARRY OUT 3D CHECKS.

Remove the outer case and check voltage between Pin Nos. 5 and 7 of the connector (A) on the control unit with an A.C. voltmeter. The meter should indicate 230 volts, if not check control unit circuity.

RY1, RY2 and RY3 Relay Test
These relays are operated by D.C. voltage.
Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking operation.
DC. voltage indicated ..... Defective relay.
DC. voltage not indicated ..... Check diode which is connected to the relay coil.
If diode is good, control unit is defective.

RELAY SYMBOL	OPERATIONAL VOLTAGE	CONNECTED COMPONENTS
RY1	APPROX. 18.0V D.C.	Oven lamp,Blower motor and Stirrer motor
RY2	APPROX. 17.5V D.C.	Power transformer 1
RY3	APPROX. 17.5V D.C.	Power transformer 2

CARRY OUT 4R CHECKS.

Q **PROCEDURES TO BE TAKEN WHEN THE FOIL PATTERN ON THE PRINTED WIRING BOARD(PWB) IS OPEN**

To protect the electronic circuits, this model is provided with a fine foil pattern added to the primary on the PWB, this foil pattern acts as a fuse. If the foil pattern is open, follow the troubleshooting guide given below for repair.

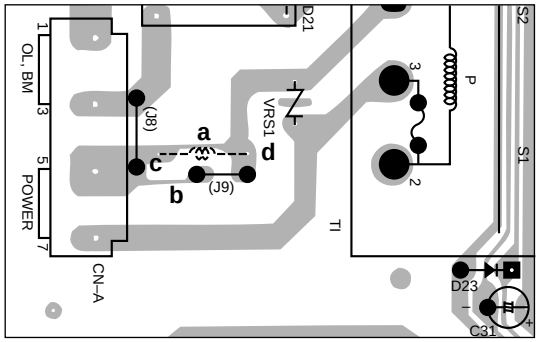
Problem: POWER ON, indicator does not light up.

CARRY OUT 3D CHECKS.

STEPS	OCCURANCE	CAUSE OR CORRECTION
1	The rated AC voltage is not present at POWER terminal of CPU connector (CN-A)	Check supply voltage and oven power cord.
2	The rated AC voltage is present at primary side of low voltage transformer.	Low voltage transformer or secondary circuit defective. Check and repair.
3	Only pattern at "a" is broken.	*Insert jumper wire J9 and solder. (CARRY OUT 3D CHECKS BEFORE REPAIR)
4	Pattern at "a" and "b" are broken.	*Insert the coil RCILF2003YAZZ between "c" and "d". (CARRY OUT 3D CHECKS BEFORE REPAIR)

NOTE: *At the time of these repairs, make a visual inspection of the varistor for burning damage and examine the transformer with tester for the presence of layer short-circuit (check primary coil resistance). If any abnormal condition is detected, replace the defective parts.

CARRY OUT 4R CHECKS.



CONTROL PANEL ASSEMBLY

OUTLINE OF CONTROL PANEL

The control section consists of the following units as shown in the touch control panel circuit.

(1) Control Unit
(2) Key Unit

The principal functions of these units and the signals communicated among them are explained below.

1. Control Unit

Signal of key touch and oven function control are all processed by one microcomputer.

1) Power Supply Circuit

This circuit changes output voltage at the secondary side of the low voltage (T1) transformer to volatges required at each part by full wave rectifying circuit, constant voltage circuit, etc..

2) ACL Circuit

This is an Auto-clear Circuit, i.e., a reset circuit, which enables IC1 to be activated from initial state.

3) Power SYNC Signal Generating Circuit

This is a circuit for generating power SYNC signal by virtue of the secondary side output of transformer T1. This signal is used for a basic frequency to time processing and so on.

4) Clock Circuit

This is a circuit for controlling clock frequency required for operating IC1.

5) IC1 (Main Processor)

This is a one-chip microcomputer, responsible for controlling the entire control unit.

6) Display Circuit

This is a circuit for driving display tubes by IC1 output.

7) Switch Input Circuit

This is a circuit for transmitting switch input information to IC1.

8) Sound-body Driving Circuit

This is a circuit for driving sound body by IC1 output.

9) Relay Driving Circuit

This is a circuit for driving output relay by IC1 output.

10) Stop Switch Circuit

This is a circuit for driving IC1 to detect door opening/closing.

11) Exhaust Air Temperature Detecting Circuit

This is a circuit for transmitting output change of thermistor (Exhaust Air Temperature Sensor) to IC1.

12) High Voltage Monitoring Circuit.

This circuit detects problems in the magnetron / high voltage circuit by sensing a variation in the current flowing through the primary winding of the high voltage transformer.

During heating, the primary current of the high voltage transformers also flows through the primary winding of the current transformers CT1 and CT2. This causes a current to be induced in the secondary windings of CT1/CT2 and results in an AC voltage which is determined by R30/R31.

This AC voltage is then half wave rectified by D30/D31 and smoothed (filtered) by C30/C31.

This AC voltage is the input to the AN3 and AN4 ports of IC1, which determines if there is a magnetron / high voltage problem.

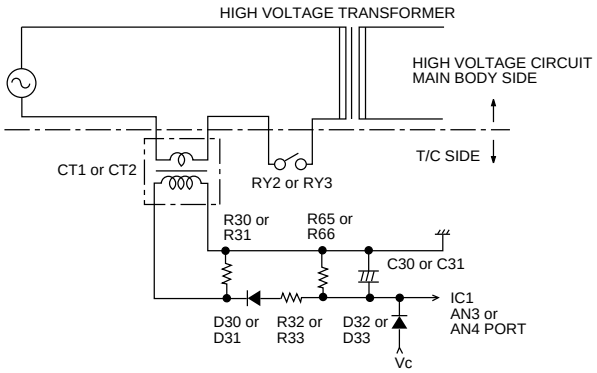


Figure T-1. High Voltage Monitoring Circuit

13) Magnetron Temperature Detecting Circuit.

This is a circuit for transmitting output change of thermistor (Magnetron Temperature Sensor) to IC1.

14) Intake Air Temperature Detecting Circuit.

This is a circuit for transmitting output change of thermistor (Intake Air Sensor) to IC1.

2. Switch Unit

The switch unit is composed of a matrix circuit in which when a switch it touched, one of signals P43 - P45 generated by the LSI, is passed through the switch and returned to the LSI as one of signals P50 - P51.

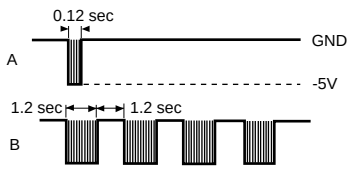
3. Encoder

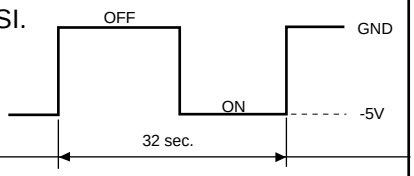
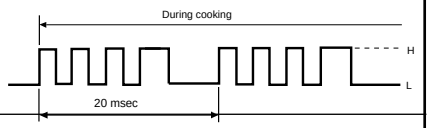
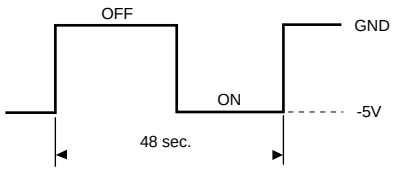
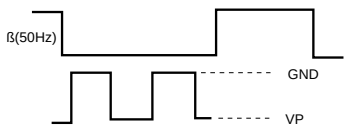
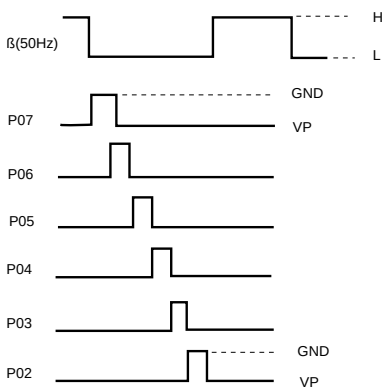
The encoder converts the signal generated by LSI into the pulse signal, and the pulse signal is returned to the LSI.

DESCRIPTION OF LSI

LSI(IZA648DR)

The I/O signal of the LSI(IZA648DR) is detailed in the following table.

Pin No.	Signal	I/O	Description
1	VCC	IN	Connected to GND.
2	VEE	IN	**Anode (segment) of Fluorescent Display light-up voltage: -35V.** Vp voltage of power source circuit input.
3	AVSS	IN	**Reference voltage input terminal.** A reference voltage applied to the A/D converter in the LSI. Connected to DC. (-5V)
4	VREF	IN	**Reference voltage input terminal.** A reference voltage applied to the A/D converter in the LSI. Connected to GND.
5-6	AN7-AN6	IN	Terminal to switch the specification.
7	AN5	IN	**Temperature measurement input: INTAKE THERMISTOR.** By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.
8	AN4	IN	A/D input for troubleshooting Magnetron 1.
9	AN3	IN	A/D input for troubleshooting Magnetron 2.
10	AN2	IN	**Temperature measurement input: EXHAUST THERMISTOR.** By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.
11	AN1	IN	**Temperature measurement input: MAGNETRON THERMISTOR.** By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.
12	P60	IN	**Input signal which communicates the door open/close information to LSI.** Door closed; "H" level signal (0V). Door opened; "L" level signal (-5.0V).
13	P55	OUT	**Power supply output at thermistor detecting circuit.** (Output -5V in cooking only, but apply high impedance to others to prevent thermistor from electrolytic corrosion ocurrence.)
14-16	P54-P52	OUT	Terminal not used.
17	P51	IN	**Signal coming from switch unit.** When either one of switches SW2 and SW4 on the switch unit is pressed, a corresponding signal out of P44 and P43 will be input into P51.
18	P50	IN	**Signal similar to P51.** When either one of switches SW1,SW3 and SW5 on the switch unit is pressed, a corresponding signal out of P43,P44 and P45 will be input into P50.
19	P47	OUT	**Signal to sound buzzer.** This signal is to control the 2.5kHz continuous signal. A: Switch touch sound. B: Completion sound. 
20	P46	OUT	Terminal not used.
21	P45	OUT	**Switch strobe signal.** Signal is applied to the switch unit. A pulse signal is input to P50 terminal while switch SW5 is pressed.
22	P44	OUT	**Switch strobe signal.** Signal is applied to the switch unit. A pulse signal is input to P50 or P51 terminal while switch SW3 or SW4 is pressed.
23	P43	OUT	**Switch strobe signal.** Signal is applied to the switch unit. A pulse signal is input to P50 or P51 terminal while switch SW1 or SW2 is pressed.
24	P42	IN	**Signal coming from encoder.** When the encoder is turned, the contacts of encoder make pulse signals. And pulse signals are input into P42.
25	INT1	IN	**Signal coming from encoder.** Signal similar to R42. Pulse signals are input into INT1.

Pin No.	Signal	I/O	Description
26	INT0	IN	**Signal synchronized with commercial power source freqency.** This is basic timing for all time processing of LSI. 
27	RESET	IN	**Auto clear terminal.** Signal is input to reset the LSI to the initial state when power is supplied. Temporarily set to "L" level the moment power is supplied, at this time the LSI is reset. Thereafter set at "H" level.
28-29	P71-P70	OUT	Terminal not used.
30	XIN	IN	**Internal clock oscillation frequency setting input.** The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XOUT terminal.
31	XOUT	OUT	**Internal clock oscillation frequency control output.** Output to control oscillation input of XIN.
32	VSS	IN	**Power source voltage: -5V.** VC voltage of power source circuit input.
33	P27	OUT	**Oven lamp, Blower motor and Stirrer motor driving signal (Square Wave-form : 50Hz).** To turn on and off the shut-off relay (RY1). The Square waveform voltage is delivered to the RY1 relay driving circuit and relays (RY2, RY3 COOK RELAY) control circuit. 
34	P26	OUT	Terminal not used.
35-36	P25-P24	OUT	**Magnetron high-voltage circuit driving signal.** To turn on and off the cook relay. In100% power level operation, "L" level during cooking; "H" level otherwise. In other power level operation (50, 20, or 10%), "H" and "L" level is repeated according to power level. P0WER LEVEL / ON / OFF 50% / 26sec. / 22sec. 20% / 12sec. / 36sec. 0% / 8sec. / 40sec. 
37-38	P23-P22	OUT	Terminal not used.
39-48	P21-P10	OUT	**Segment data signal.** The relation between signals and indicators are as follows: Signal Segment / Signal Segment P01 ..... i / P15 ..... f P00 ..... j,k / P14 ..... e P21 ..... LB / P13 ..... d P20 ..... UB / P12 ..... c P17 ..... h / P11 ..... b P16 ..... g / P10 ..... a 
49-54	P07-P02	OUT	**Digit selection signal.** The relation between digit signal and digit are as follows: Digit signal / Digit P07 / 1st. P06 / 2nd. P05 / 3rd. P04 / 4th. P03 / 5th. P02 / 6th. Normally, one pulse is output in every ß period, and input to the grid of the Fluores-cent Display. 
55-56	P01-P00	OUT	**Segment data signal.**

Pin No.	Signal	I/O	Description
			Signal similar to P21.
57-64	P37-P30	OUT	Terminal not used.

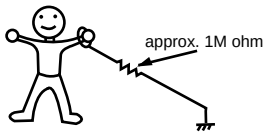
SERVICING

1. Precautions for Handling Electronic Components

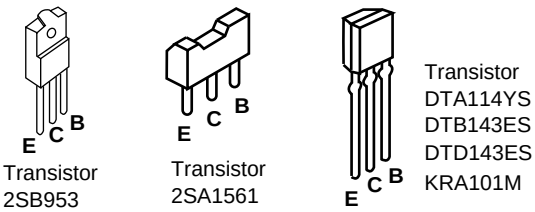
This unit uses CMOS LSI in the integral part of the circuits. When handling these parts, the following precautions should be strictly followed. CMOS LSI have extremely high impedance at its input and output terminals. For this reason, it is easily influenced by the surrounding high voltage power source, static electricity charge in clothes, etc, and sometimes it is not fully protected by the built-in protection circuit.

In order to protect CMOS LSI.

1) When storing and transporting, thoroughly wrap them in aluminium foil. Also wrap all PW boards containing them in aluminium foil.
2) When soldering, ground the technician as shown in the figure and use grounded soldering iron and work table.



2. Shapes of Electronic Components



3. Servicing of Touch Control Panel

We describe the procedures to permit servicing of the touch control panel of the microwave oven and the precautions you must take when doing so. To perform the servicing, power to the touch control panel is available either from the power line of the oven itself or from an external power source.

(1) Servicing the touch control panel with power supply of the oven:

CAUTION: THE HIGH VOLTAGE TRANSFORMER OF THE MICROWAVE OVEN IS STILL LIVE DURING SERVICING PRESENTS A HAZARD.

Therefore, when checking the performance of the touch control panel, put the outer cabinet on the oven to avoid touching the high voltage transformer, or unplug the primary terminal (connector) of the high voltage transformer to turn it off; the end of such connector must be insulated with an insulating tape. After servicing, be sure to replace the leads to their original locations.

A. On some models, the power supply cord between the touch control panel and the oven itself is so short that the two can't be separated. For those models, check and repair all the controls (sensor-related ones included) of the touch control panel while keeping it connected to the oven.

B. On some models, the power supply cord between the touch control panel and the oven proper is long enough that they may be separated from each other. For those models, therefore, it is possible to check and repair the controls of the touch control panel while keeping it apart from the oven proper; in this case you must short both ends of the door sensing switch (on PWB) of the touch control panel with a jumper, which brings about an operational state that is equivalent to the oven door being closed. As for the sensor-related controls of the touch control panel, checking them is possible if dummy resistor(s) with resistance equal to that of the controls are used.

(2)Servicing the touch control panel with power supply from an external power source:

Disconnect the touch control panel completely from the oven proper, and short both ends of the door sensing switch (on PWB) of the touch control panel, which brings about an operational state that is equivalent to the oven door being closed. Connect an external power source to the power input terminal of the touch control panel, then it is possible to check and repair the controls of the touch control panel it is also possible to check the sensor-related controls of the touch control panel by using the dummy resistor(s).

4. Servicing Tools

Tools required to service the touch control panel assembly.

1) Soldering iron: 30W
(It is recommended to use a soldering iron with a grounding terminal.)
2) Oscilloscope: Single beam, frequency range: DC-10MHz type or more advanced model.
3) Others: Hand tools

5. Other Precautions

1) Before turning on the power source of the control unit, remove the aluminium foil applied for preventing static electricity.
2) Connect the connector of the key unit to the control unit being sure that the lead wires are not twisted.
3) After aluminium foil is removed, be careful that abnormal voltage due to static electricity etc. is not applied to the input or output terminals.
4) Attach connectors, electrolytic capacitors, etc. to PWB, making sure that all connections are tight.
5) Be sure to use specified components where high precision is required.

COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

WARNING: Avoid possible exposure to microwave energy. Please follow the instructions below before operating the oven.

1. CARRY OUT 3D CHECKS.
2. Make sure that a definite" click" can be heard when the microwave oven door is unlatched. (Hold the door in a closed position, then pull the door release lever with one hand, this causes the latch leads to rise, it is then possible to hear a "click' as the door switches operate.)
3. Visually check the door and cavity face plate for damage (dents, cracks, signs of arcing etc.).

Carry out any remedial work that is necessary before operating the oven.
Do not operate the oven if any of the following conditions exist;

1. Door does not close firmly.
2. Door hinge, support or latch hook is damaged.
3. The door gasket or seal or damaged.
4. The door is bent or warped.
5. There are defective parts in the door interlock system.
6. There are defective parts in the microwave generating and transmission assembly.
7. There is visible damage to the oven.

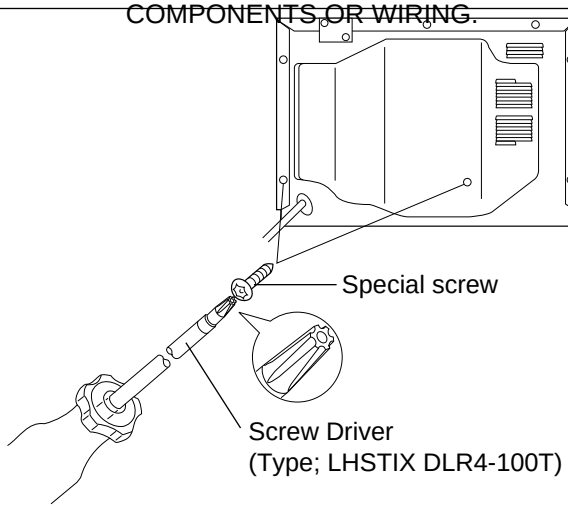
Do not operate the oven:
1. Without the RF gasket (Magnetron).
2. If the wave guide or oven cavity are not intact.
3. If the door is not closed.
4. If the outer case (cabinet) is not fitted.

Please refer to 'OVEN PARTS, CABINET PARTS, DOOR PARTS', when carrying out any of the following removal procedures:

OUTER CASE REMOVAL

To remove the outer case, proceed as follows.
1. Disconnect oven from power supply.
2. Open the oven door and wedge it open.
3. Remove the two (2) screws from the lower portion of the rear cabinet and lower left portion of the oven cabinet back side using by special screw drive (Type; LHSTIX DLR4-100T).
4. Remove the screws from rear and along the side edge of case.
5. Slide the entire case back about 3cm to free it from retaining clips on the cavity face plate.
6. Lift the entire case from the oven.
7. Remove the screws holding the rear cabinet to the oven.
8. Remove the rear cabinet.
9. Discharge the HV capacitor before carrying out any further work.
10. Do not operate the oven with the outer case removed.

N.B.; Step 1,2 and 9 form the basis of the 3D checks.
CAUTION: DISCHARGE HIGH VOLTAGE CAPACITOR BEFORE TOUCHING ANY OVEN COMPONENTS OR WIRING.



HIGH VOLTAGE COMPONENTS REMOVAL
(High Voltage Capacitor and High Voltage Rectifier Assembly)

To remove the components, proceed as follows.
1. CARRY OUT 3D CHECKS.
2. Remove two (2) screws holding earth side terminals of high voltage rectifier assemblies.
3. Disconnect all the leads and terminals of high voltage rectifier assembly from high voltage capacitor.
4. Remove two (2) screws holding capacitor holder to the right side of oven cavity and remove the capacitor holder.
5. Now, high voltage rectifier assembly should be free.

CAUTION
1. DO NOT REPLACE ONLY HIGH VOLTAGE RECTIFIER. WHEN REPLACE IT, REPLACE HIGH VOLTAGE RECTIFIER ASSEMBLY.
2. WHEN REPLACING HIGH VOLTAGE RECTIFIER ASSEMBLY, ENSURE THAT THE CATHODE (EARTH) CONNECTION IS SECURELY FIXED TO THE CHASSIS WITH A EARTHING SCREW.

6. Now, the two (2) high voltage capacitors are free.

MAGNETRON REMOVAL

1. Remove the outer case cabinet referring to "OUTER CASE REMOVAL" and CARRY OUT 3D CHECKS.
2. Remove the eleven (11) screws holding the rear cabinet to the oven cavity.
3. Disconnect the power supply cord from the noise filter.
4. Remove the one (1) screw holding the earth wire of the power supply cord to the noise filter angle.
5. Remove the rear cabinet with the power supply cord from the oven cavity.
6. Remove the two (2) screws holding the magnetron exhaust duct to upper and lower waveguide.
7. Disconnect all the wire leads from the two (2) magnetrons.
8. Carefully remove each four (4) screws holding each two (2) magnetrons to waveguide. When removing the screws hold the magnetron to prevent it from falling.
9. Remove the magnetron from the waveguide with care so the magnetron antenna is not hit by any metal object around the antenna.
4. Now, the magnetron is free.

CAUTION: WHEN REPLACE THE MAGNETRON, BE SURE THE R.F. GASKET IS IN PLACE AND THE MAGNETRON MOUNTING SCREWS TIGHTENED SECURELY.

HIGH VOLTAGE TRANSFORMER REMOVAL

1. Remove the outer case cabinet referring to "OUTER CASE REMOVAL" and CARRY OUT 3D CHECKS.
2. Disconnect the all wire leads from the magnetron(s).
3. Remove the wire holder holding the high voltage wires.
4. Disconnect all wire leads from the high voltage transformer(s).
5. Remove the each two (2) screws holding each high voltage transformer.
6. Now, high voltage transformer(s) is (are) free.

BLOWER MOTOR REMOVAL

1. CARRY OUT 3D CHECKS.
2. Disconnect the wire leads from the blower motor and the blower motor thermal cut-out.
3. Remove the one (1) screw holding the blower motor to the oven cavity.
4. Remove the one (1) screw holding the blower motor to the chassis support.
5. Remove the blower motor. Now, the blower motor is free.

STIRRER MOTOR (UPPER) REMOVAL

1. Remove the outer case cabinet referring to "OUTER CASE REMOVAL" and CARRY OUT 3D CHECKS.
2. Disconnect the wire leads from the stirrer motor (upper).
3. Remove the one (1) screw holding the stirrer motor (upper) to the oven cavity.
4. Turn and lift up the stirrer motor (upper).
5. Now, the stirrer motor (upper) is free.

STIRRER MOTOR (LOWER) REMOVAL

1. Disconnect oven from the power supply.
2. Remove the stirrer motor cover by snipping off the material in four portions.
3. Where the portions have been snipped off bend the portions flat. No sharp edge must be evident after removal of the stirrer cover.
4. Disconnect wire leads from the stirrer motor. (See "Positive lock connector removal")
5. Remove one (1) screw holding the stirrer motor to oven cavity.
6. Now, the stirrer motor (lower) is free.
7. After replacement use the one (1) screw to fit the stirrer motor cover. (This screw has been fitted to the base plate near the stirrer motor cover beforehand.)

OVEN LAMP SOCKET REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the oven lamp.
3. Pull the wire leads from the oven lamp socket by pushing the terminal hole of the oven lamp socket with the flat type small screw driver.
4. Lift up the oven lamp socket.
5. Now, the oven lamp socket is free.

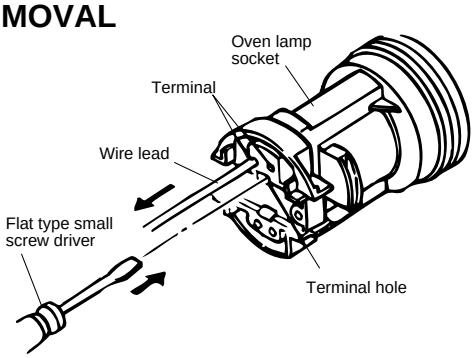


Figure C-1. Oven lamp socket

CONTROL PANEL ASSEMBLY AND CONTROL UNIT REMOVAL

CONTROL PANEL ASSEMBLY REMOVAL

The complete control panel should be removed for replacement of components. To remove the control panel, proceed as follows:

1. CARRY OUT 3D CHECKS.
2. Remove the air intake filter assembly from the base plate.
3. Remove two (2) screws holding the control panel to the base plate.
4. Pull down the control panel and remove it forward.
5. Disconnect two connectors (A), (B), (D), (H) and TAB terminal (TAB1,2,3,4) from the control unit.
6. Now the control panel assembly is free.

CAUTION FOR TOUCH CONTROL PANEL REMOVAL

1) Hold the lower end (Position A, Fig. 1) of the touch control panel assembly firmly while sliding it down and toward you.

DO NOT FORCE THE CONTROL UNIT TO SLIDE DOWN DURING REMOVAL. THIS MAY CAUSE DAMAGE TO THE CONTROL UNIT BY HITTING A RELAY (RY-4) OR THE TAB TERMINALS LOCATED AT THE FRONT OF THE OVEN CAVITY.

2) If the Touch Control Panel is hard to remove;
(1) Insert a flat head screw driver into space B . (Fig. 1)
(2) Rotate the screwdriver clockwise while holding position C of the Touch Control Panel. (Fig. 2)

TO AVOID DAMAGE TO TOUCH CONTROL PANEL, COVER THE TIP OF SCREWDRIVER WITH TAPE.

(3) Re-solder the Relay (RY-4) prior to reinstalling the Touch Control Panel.

Fig. 1

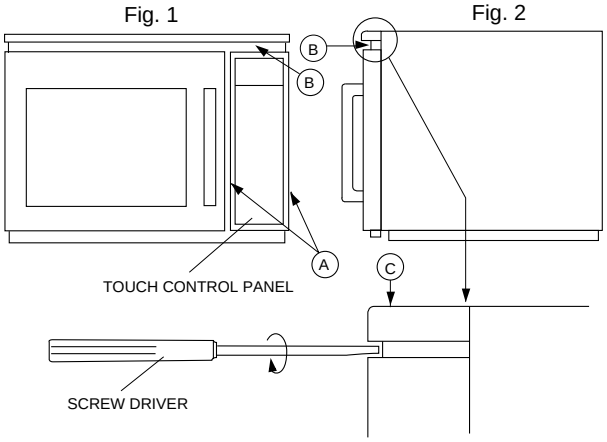


Fig. 2

Replacement of individual component is as follows:

CONTROL UNIT AND CONTROL PANEL FRAME (WITH SWITCH UNIT)

7. Remove two (2) screws holding the control panel mounting angle to the panel frame.
8. Lift up the control panel mounting angle from the panel frame.
9. Remove six (6) screws holding the control unit to the panel frame assembly.
10. Push down the right side two (2) hooks fixing the control unit to the panel frame assembly, and lift up the control unit upward.
11. Now, the control unit and control panel frame (with switch unit) are free.

CAUTION:

At installing control panel unit assembly to main body set:

1. **Ensure the installation of wiring-related parts without negligence.**
2. **When inserting key cable to main body set, ensure them free from caught-in trouble. In addition, when installing the control panel assembly to base plate with screws, be sure of pushing the control panel unit upward to fix with screws firmly.**
3. **Do not allow any wire leads to come near the varistor works, because it will explode and the wire leads near by the varistor will be damaged.**

SWITCH UNIT

12. Remove the three (3) screws holding the switch unit (Main) to the control panel frame.
13. Remove the two (2) screws holding the switch unit (Sub.) to the control panel frame.
14. Now, the switch unit is free

ROTARY ENCODER

12. Remove the two (2) screws holding the earth wire to the rotary encoder and control panel mounting angle.
13. Remove the two (2) screws holding the rotary encoder to the control panel frame.
14. Remove the knob from the rotary encoder shaft.
15. Now, the rotary encoder is free.

HOW TO RELEASE THE POSITIVE LOCK® CONNECTOR.

Procedure

1. Pushing the lever of positive lock® connector.
2. Pull down the connector from the terminal.
3. Now, the connector is free.

Note: If the positive lock® has a insulation sleeve, first remove it. If you do not so, you can not push the lever of positive lock®.

CAUTION: The positive lock® terminal can not be disconnected by only pulling. Because once you (Service personnel) have connected the positive lock® connector to the terminal, the positive lock® connector has been locked.

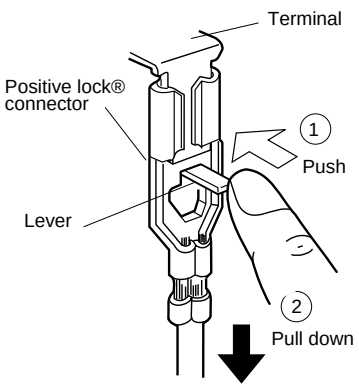


Figure C-2. How to release the positive lock connector.

POWER SUPPLY CORD REPLACEMENT

1. CARRY OUT 3D CHECKS.
2. Release the cord bushing from the rear cabinet.
3. Disconnect the brown and blue wires of the power supply cord from the noise filter.
4. Loosen the single (1) screw holding the earth angle and earth wire of power supply cord.
5. Remove the power supply cord.

CAUTION: DO NOT ALLOW THE WIRE LEADS OF THE POWER SUPPLY CORD TO COME NEAR THE HIGH VOLTAGE TRANSFORMER. BECAUSE THE HIGH VOLTAGE TRANSFORMER BECOMES HOT.

Re-install

1. Insert the power supply cord into the cord bushing.
2. Connect the brown and blue wires of power supply cord into the terminals of noise filter, referring to pictorial diagram.
3. Insert the green/yellow wire of power supply cord into the earth angle, and tight the screw holding the earth angle.
4. Re-install the cord bushing to the rear cabinet.
5. Re-install the rear cabinet to oven cavity and the bottom plate with the eleven (11) screws and two (2) washers.
6. CARRY OUT 4R CHECKS.

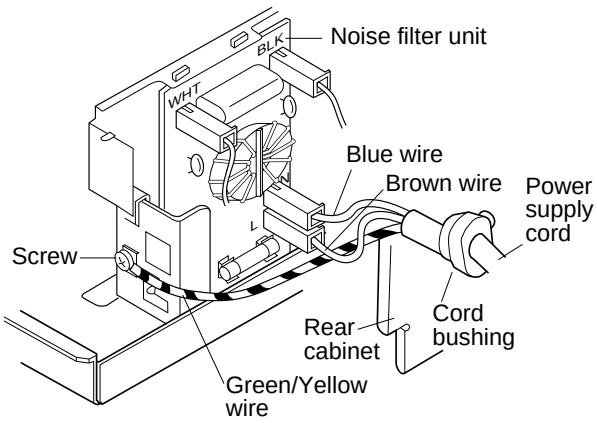


Figure C-3. Power supply cord replacement

1ST LATCH, 2ND LATCH, 3RD LATCH, MONITOR, AND STOP SWITCHES REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the control panel from the oven cavity referring to “CONTROL PANEL REMOVAL”.
3. Remove the two (2) screws holding the latch hook to the oven cavity.
4. Open the door and pull the latch hook out of the oven cavity.
5. For 1st latch, 2nd latch or Monitor switch removal
   5-1. Disconnect the wire leads from the switch.
   5-2. Push the retaining tabs outward slightly and then pull the switch forwards and remove it from the latch hook.
6. For 1st latch and stop switches removal
   6-1. Disconnect the wire leads from the 1st latch and stop switches.
   6-2. Remove the single (1) screw and nut holding the 1st latch and stop switches to the latch hook.

CAUTION: WHEN THE 1ST LATCH SWITCH AND 2ND. LATCH SWITCH ARE INSTALLED, THE TWO (2) TABS OF THE LATCH HOOK SHOULD BE BROKEN.

1ST, 2ND, 3RD LATCH SWITCH, STOP SWITCH AND MONITOR SWITCH ADJUSTMENT

In case 1st latch switch, 2nd latch, stop switch, 3rd latch switch and monitor switch do not operate properly due to a mis-adjustment, the following adjustment should be made.

1. Loosen the two (2) screws holding the latch hook.
2. With the door closed, adjust the latch hook by moving it back and forward, or up and down. In and out play of the door allowed by the latch hook should be less than 0.5mm. The vertical position of the latch hook should be placed where the stop switch and 1st, 2nd, 3rd latch switches have activated with the door closed.
   The horizontal position of the latch hook should be placed where the monitor switch has activated with the door closed.
3. Secure the screws with washers firmly.
4. Make sure of the 1st, 2nd, 3rd latch switches, stop switch, and monitor switch operation. If those switches have not activated with the door closed, loose two (2) screws holding latch hook and adjust the latch hook position.

After adjustment, make sure of the following:

1. The stop switch and 1st, 2nd, 3rd latch switches interrupt the circuit before the door open when the door release lever is pulled, and then and monitor switch close the circuit when the door is opened.
2. Re-install outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

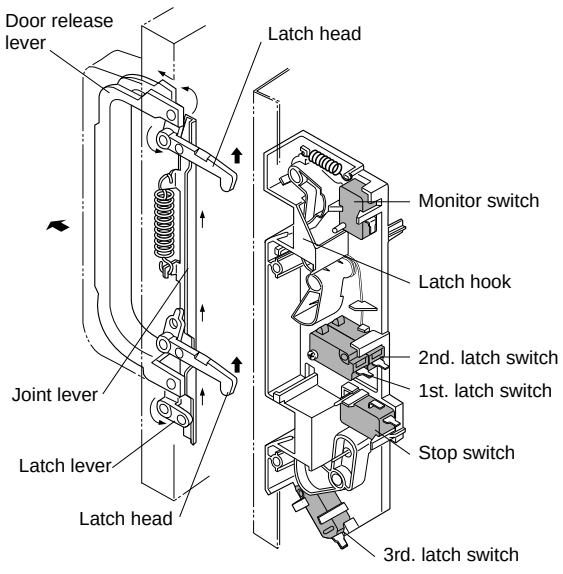


Figure C-4 Latch Switch Adjustments

DOOR REPLACEMENT AND ADJUSTMENT

DOOR REPLACEMENT

1. CARRY OUT 3D CHECKS.
2. Remove four (4) screws holding the upper and lower oven hinge to the oven cavity.
3. Remove door assembly with upper and lower oven hinges by pulling it forward.
4. On re-installing new door assembly, secure the upper and lower oven hinges with the four (4) mounting screws to the oven cavity. Make sure the door is parallel with bottom line of the oven face plate and the latch head pass through the latch holes correctly.
5. CARRY OUT 4R CHECKS.

   Note: After any service to the door, the approved microwave survey meter should be used to assure in compliance with proper microwave radiation standards. (Refer to Microwave Measurement Procedure.)

DOOR ADJUSTMENT

When removing and/or loosening hinges such as in door replacement, the following adjustment criteria are taken. Door is adjusted to meet the following three conditions by keeping screws of hinge loose.

1. Adjust door latch heads at a position where they smoothly catch the latch hook through the latch holes. Refer to latch switch adjustments.
2. Deviation of the door alignment from horizontal line of cavity face plate is to be less than 1.0mm.
3. The door is positioned with its face depressed toward the cavity face plate.
4. Reinstall outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

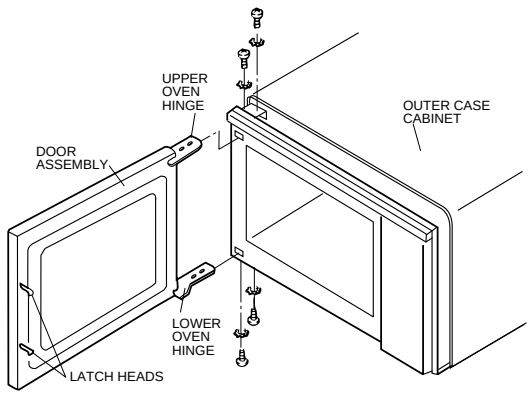


Figure C-5. Door Assembly Replacement and Adjustment

CHOKE COVER REMOVAL

1. Insert an iron plate (thickness of about 0.5mm or flat type screw driver to the gap between the choke cover and door panel as shown figure to free the engaging part. The protect sheet may be used not to damage the door panel.
2. Lift up the choke cover, now cove is free.

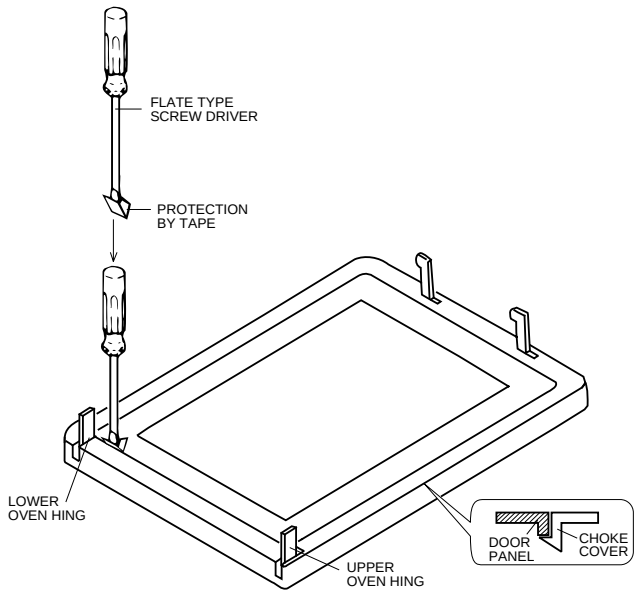


Figure C-6. Choke Cover Removal

DOOR COMPONENTS REMOVAL

Remove the door assembly, referring to from item 1 through item 3 of “DOOR REPLACEMENT”.

1. Place the door assembly on a soft cloth with facing up.

(UPPER AND LOWER OVEN HINGE REMOVAL)

2. Remove the choke cover, referring to “CHOKE COVER REMOVAL”.
3. Release the oven hinges from the door panel.
4. Now, the oven hinges are free.

(DOOR HANDLE REMOVAL)

5. Remove the two (2) screws holding the door handle to door.
6. Remove the door handle from the door panel.

(UPPER AND LOWER LATCH HEADS REMOVAL)

7. Remove the door release lever from the door assembly.
8. Remove the three (3) screws holding the joint plate to the door panel.
9. Release the latch spring from the tab of the joint lever and joint plate.
10. Release the latch heads from joint lever and joint plate.
11. Now, the latch heads are free.

(DOOR FRAME REMOVAL)

12. Set the four (4) tabs of the door frame upright.
13. Remove the door frame from the door panel. Now, door frame is free.

(DOOR GLASS REMOVAL)

14. Remove the four (4) screws holding the two (2) outside window fixing plates to the door panel.
15. Now, the door glass is free.

SERVICE INFORMATION

IMPORTANT: When replace the magnetron MG1 and/or MG2, the relays RY3 and RY4 on control unit must be replaced at the same time. Because if the magnetron's life has been over, the relay's life may also be over.

MICROWAVE MEASUREMENT

After adjustment of door latch switches, monitor switch and door are completed individually or collectively, the following leakage test must be performed with a survey instrument and it must be confirmed that the result meets the requirements of the performance standard for microwave oven.

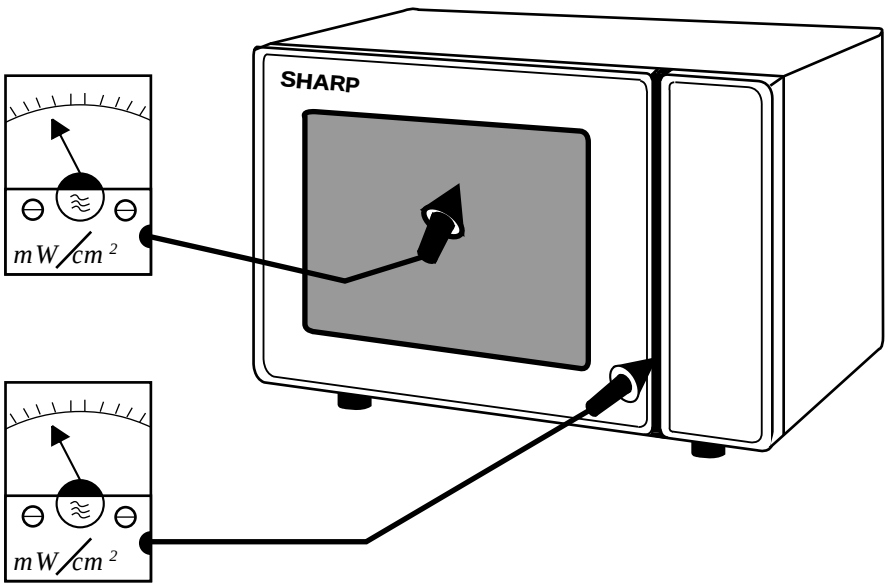
REQUIREMENT

The safety switch must prevent microwave radiation emission in excess of 5mW/cm2 at any point 5cm or more from external surface of the oven.

PREPARATION FOR TESTING:

Before beginning the actual test for leakage, proceed as follows;

1. Make sure that the test instrument is operating normally as specified in its instruction booklet.
   Important:
   Survey instruments that comply with the requirement for instrumentations as prescribed by the performance standard for microwave ovens must be used for testing.
   Recommended instruments are:
   NARDA 8100
   NARDA 8200
   HOLADAY HI 1500
   SIMPSON 380M
2. Place the oven tray into the oven cavity.
3. Place the load of 275 ± 15ml of water initially at 20 ± 5˚C in the centre of the oven tray. The water container should be a low form of 600 ml beaker with inside diameter of approx. 8.5cm and made of an electrically non-conductive material such as glass or plastic.
   The placing of this standard load in the oven is important not only to protect the oven, but also to insure that any leakage is measured accurately.
4. Close the door and turn the oven ON with the timer set for several minutes. If the water begins to boil before the survey is completed, replace it with 275ml of cool water.
5. Move the probe slowly (not faster that 2.5cm/sec.) along the gap.
6. The microwave radiation emission should be measured at any point of 5cm or more from the external surface of the oven.



Microwave leakage measurement at 5 cm distance

TEST DATA AT A GLANCE

Parts	Symbol	Value / Data
Weak point	WP1 , WP1	A018 for R-2287
Fuse	WP1, WP2	M6.3A for R-2277
Weak point	F1	A017 for R-2287
Fuse	F1	13A for R-2277
Fuse	F2	F6.3A 250V
Thermal cut-out (Mag)	TC1	145˚C
Thermal cut-out (Mag.)	TC2	145˚C
Thermal cut-out (Blower motor)	TC3	115˚˚C
Thermal cut-out (Oven)	TC4	115˚˚C
Thermistor (Exhaust) 25˚C		Approx. 77.45kΩ at 15˚C, 61.47KΩ at 20˚C, 49.12KΩ at
Thermistor (Intake)		Approx. 15.8kΩ at 15˚C, 13.03KΩ at 20˚C, 10.74KΩ at 25˚C
Thermistor (Magnetron)		Approx. 15.91kΩ at 15˚C, 13.04KΩ at 20˚C, 10.74KΩ at 25˚C
Monitor resistor	R1	4.3Ω 20W
Oven lamp	OL	250V 25W
High voltage capacitor (R-2287)	C1, C2	1.07μF AC 2100V
High voltage capacitor (R-2287)	C1, C2	0.94μF AC 2100V
High voltage transformer (R-2287)	T1, T2	Filament winding < 1Ω Secondary winding Approx. 57Ω Primary winding Approx. 1Ω
High voltage transformer (R-2277)	T1, T2	Filament winding < 1Ω Secondary winding Approx. 83Ω Primary winding Approx. 2Ω
Magnetron	MG1	Filament winding < 1Ω Filament winding - chassis ∞ Ω
Magnetron	MG2	Filament winding < 1Ω Filament winding - chassis ∞ Ω

TEST POINT ON CONTROL UNIT

In/Out pit terminal	Test Point	Volt	Resistance (Disconnect the power plug and close the door.)
Input terminal (Power suplly)	A5- A7	230V	Approx. 790Ω
Output terminal (Stop switch)	B1- B2		0
Output terminal (Oven lamp +Blower motor + Stirrer motor)	A1- A7	230V	Approx. 225Ω
Output terminal (Earth)	B1- Chassis		0

WARNING: DISCONNECT THE PLUG WHEN MEASURING RESISTANCE.

SCHEMATIC

NOTE: CONDITION OF OVEN

1. DOOR CLOSED
2. [•] APPEARS ON DISPLAY

NOTE: "★" INDICATES COMPONENTS WITH POTENTIALS ABOVE 250V.

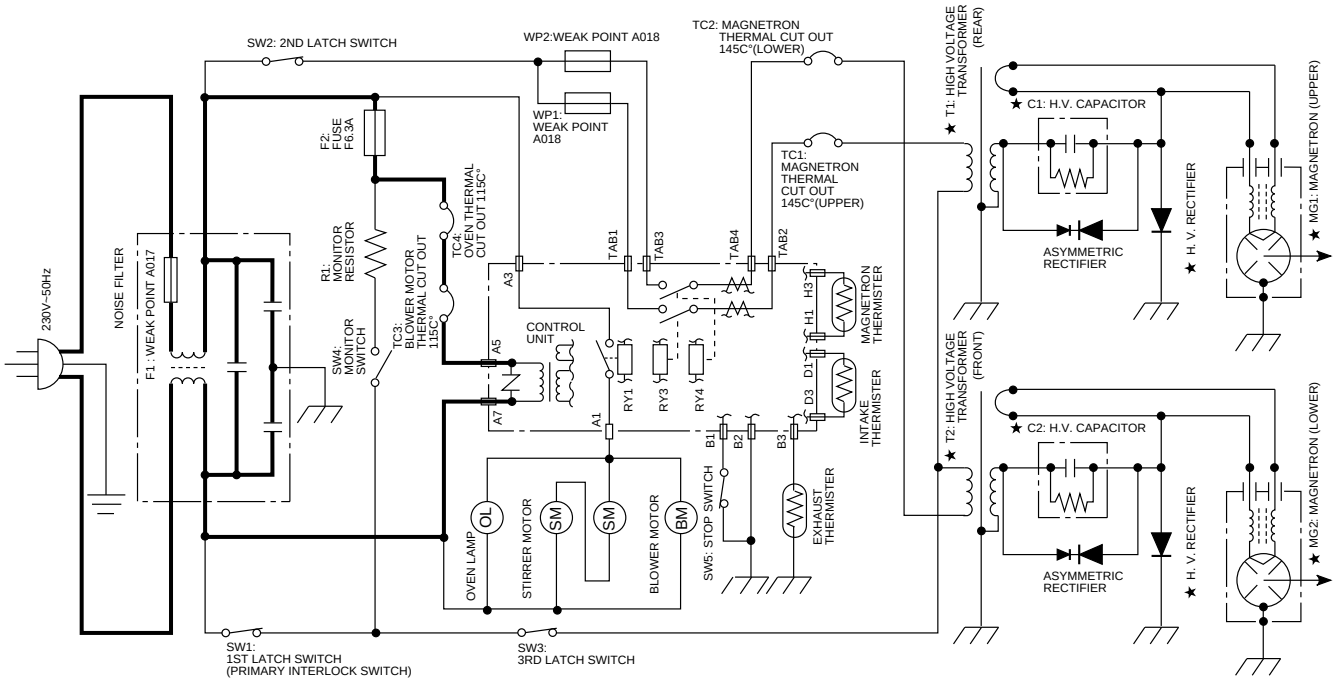


Figure O-1. Oven SChematic-OFF Condition

SCHEMATIC

NOTE: CONDITION OF OVEN

1. DOOR CLOSED.
2. COOKING TIME ENTERED.
3. /100% BUTTON TOUCHED.
4. START ◇ BUTTON TOUCHED.

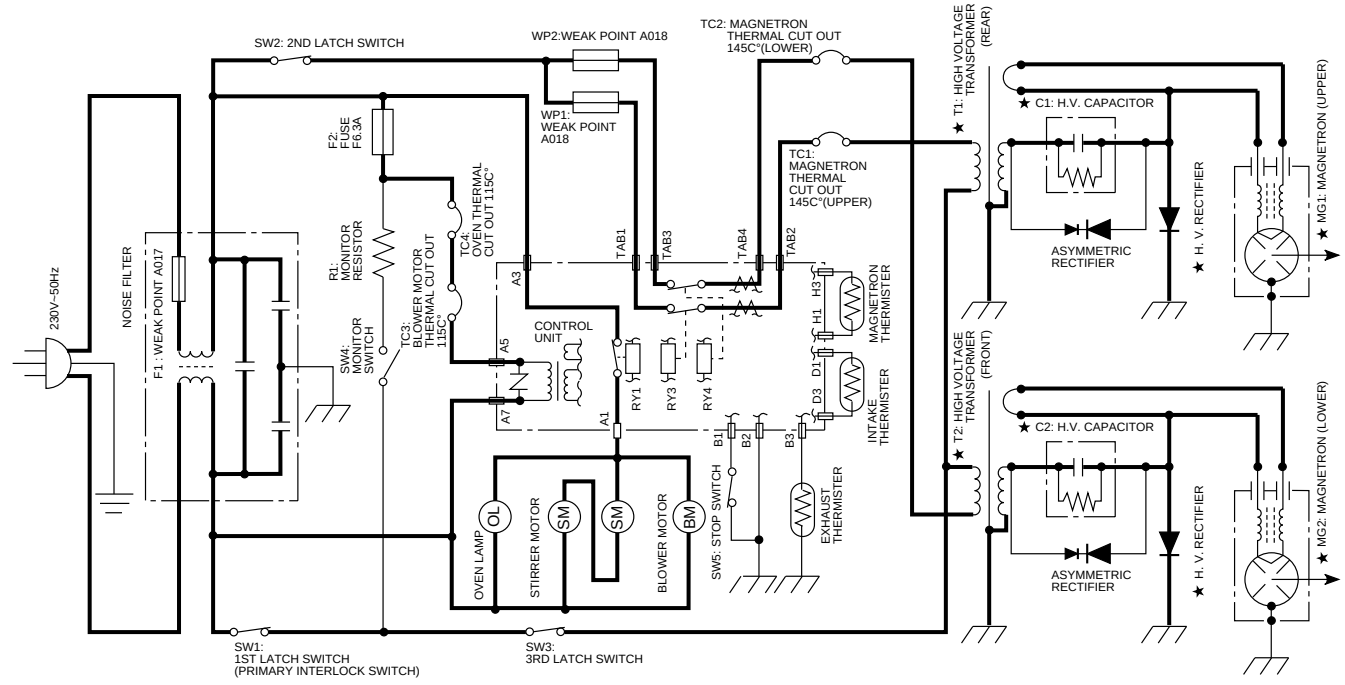


Figure O-2. Oven SChematic-ON Condition

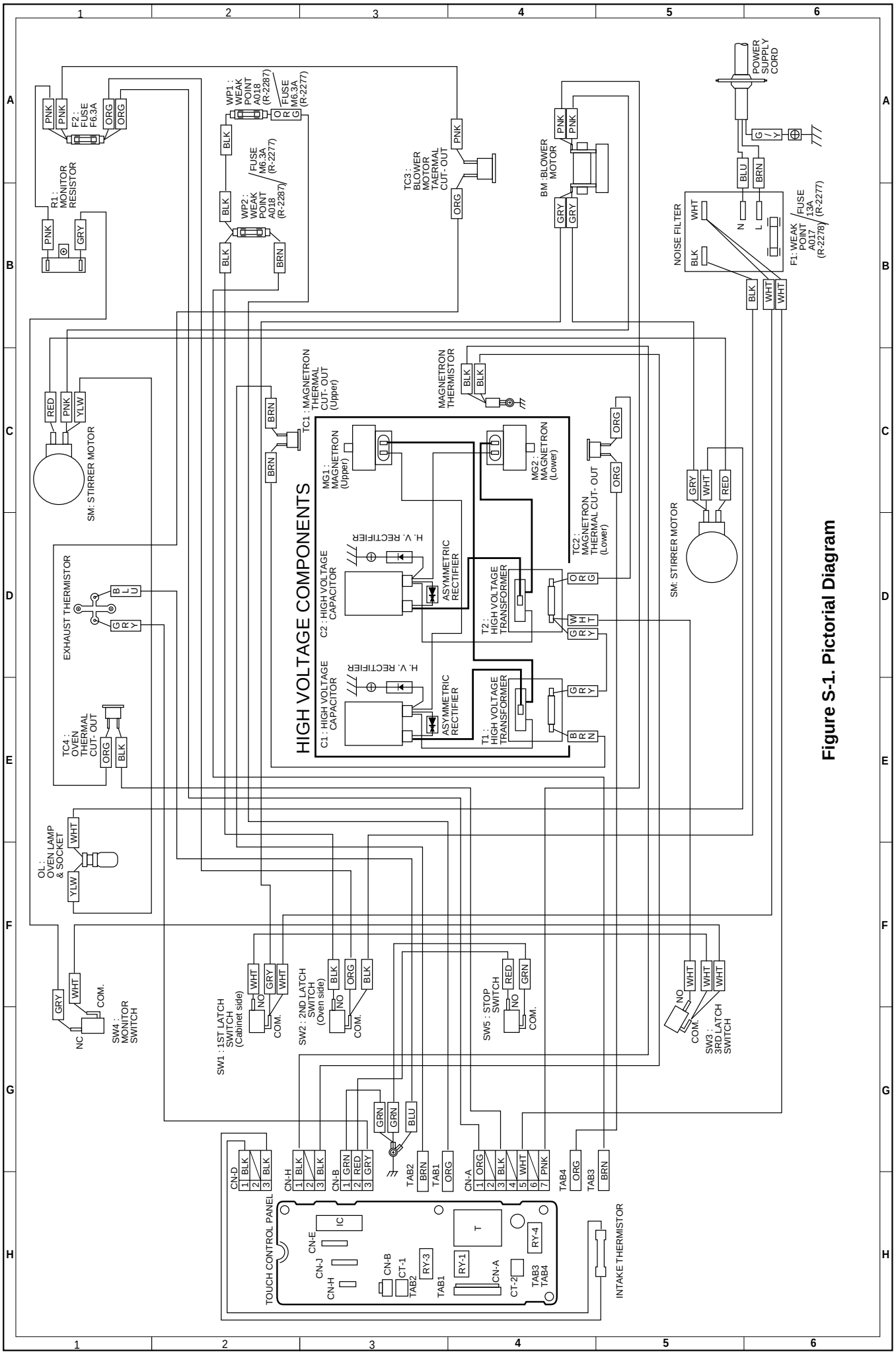


Figure S-1. Pictorial Diagram

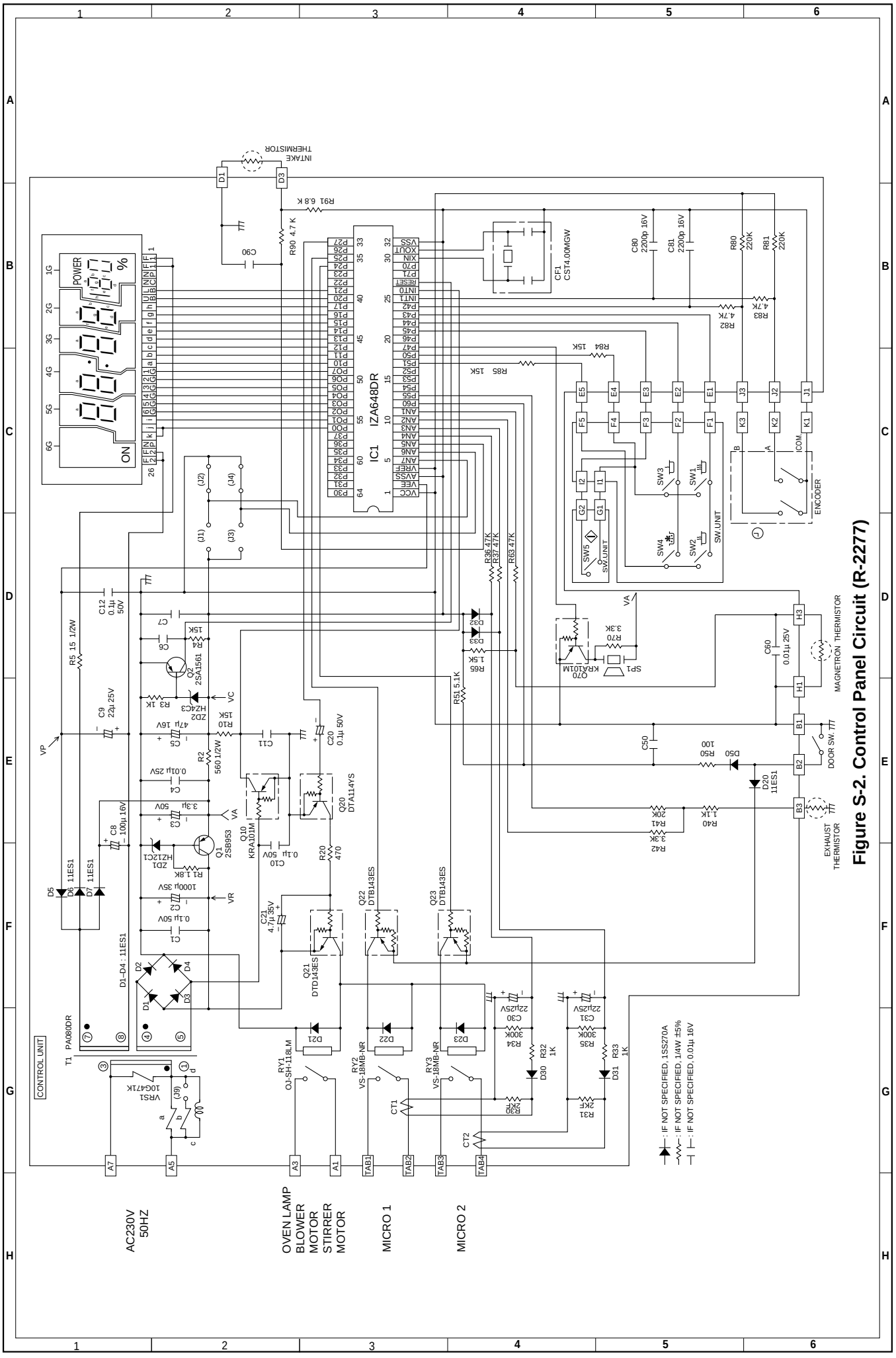


Figure S-2. Control Panel Circuit (R-2277)

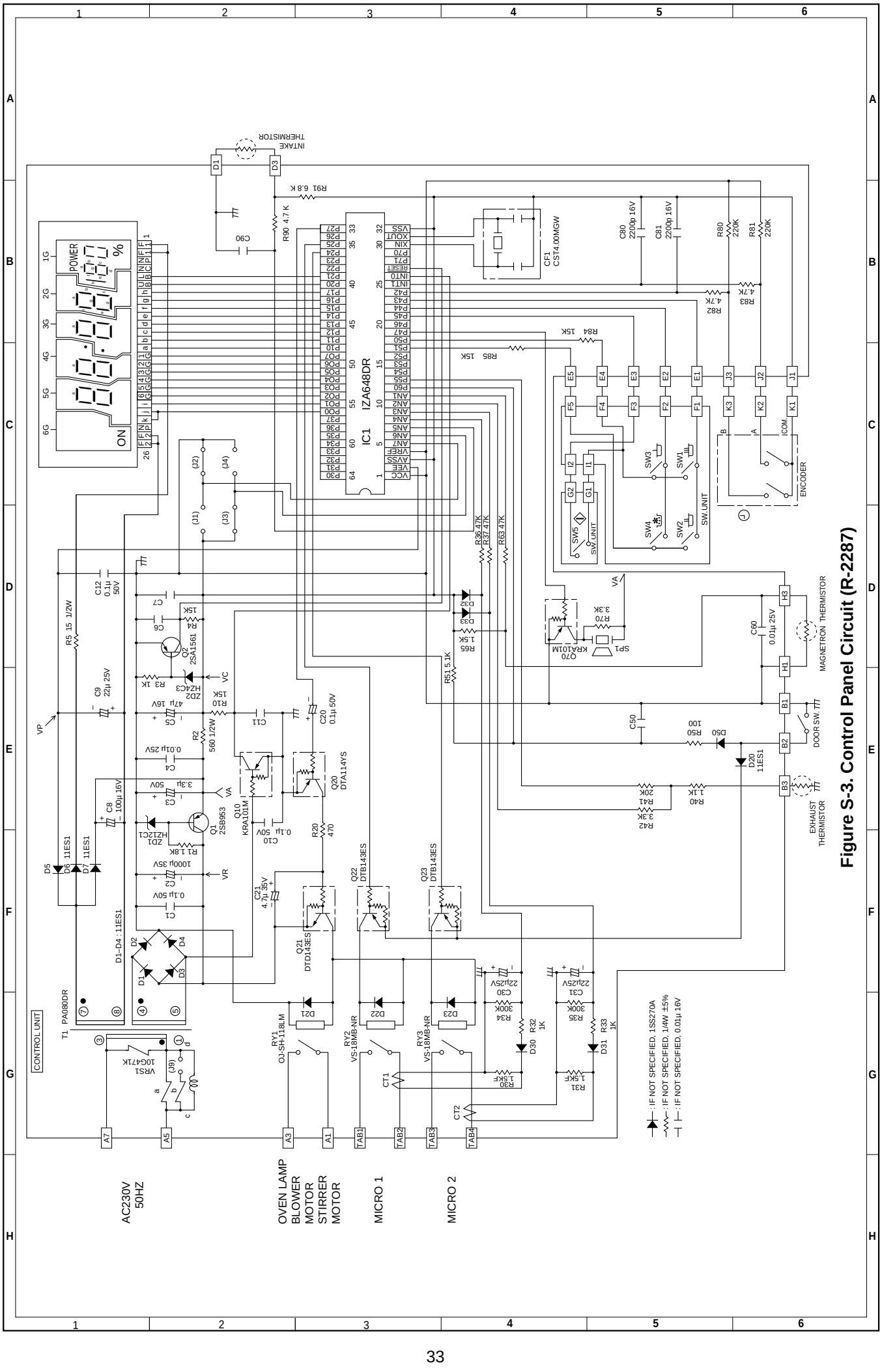


Figure S-3. Control Panel Circuit (R-2287)

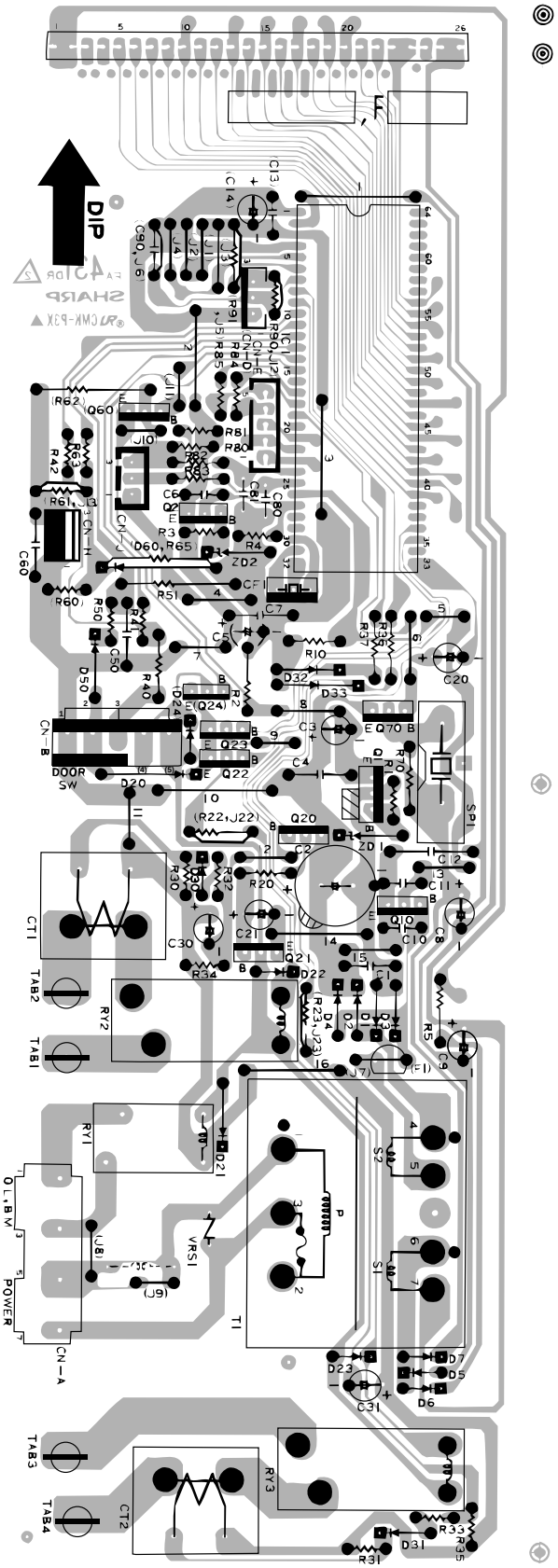


Figure S-3. Printed Wiring Board

PARTS LIST

Note: The parts marked "∆" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
		ELECTRIC PARTS		
BM	FMOTEA309WRK0	Blower motor	1	AH
F1	QFS-CA009WRE0	Fuse 13A [R-2277]	1	AD
F1	QFS-CA017WRE0	Weak point A017 [R-2287]	1	AF
F2	QFS-CA007WRE0	Fuse F6.3A	1	AD
WP1, WP2	QFS-C0019WRE0	Fuse M6.3A [R-2277]	2	AE
WP1, WP2	QFS-CA018WRE0	Weak point A018 [R-2287]	2	AD
SW1	QSW-MA095WRE0	1st. latch switch	1	AF
SW2	QSW-MA095WRE0	2nd. latch switch	1	AF
SW3	QSW-MA095WRE0	3rd. latch switch	1	AF
SW4	QSW-MA086WRE0	Monitor switch	1	AF
SW5	QSW-MA085WRE0	Stop switch	1	AF
* C1, C2	RC-QZA165WRE0	High voltage capacitor [R-2287]	2	AX
* C1, C2	RC-QZA169WRE0	High voltage capacitor [R-2277]	2	AW
OL	RLMPTA028WRE0	Oven lamp	1	AK
SM	RMOTDA205WRE0	Stirrer motor	2	AR
R1	RR-WZA020WRE0	Monitor resistor 4.3 Ω 20W	1	AF
TC1	RTHM-A037WRE0	Magnetron thermal cut-out 145˚C	1	AG
TC2	RTHM-A057WRE0	Magnetron thermal cut-out 145˚C	1	AG
TC3	RTHM-A015WRE0	Blower motor thermal cut-out 115˚C	1	AG
TC4	RTHM-A083WRE0	Oven thermal cut-out 115˚C	1	AH
* T1, T2	RTRN-A459WRE0	High voltage transformer [R-2287]	2	BP
* T1, T2	RTRN-A458WRE0	High voltage transformer [R-2277]	2	BL
∆* MG1, MG2	RV-MZA237WRE0	Magnetron [R-2277]	2	BH
∆* MG1, MG2	RV-MZA239WRE0	Magnetron [R-2287]	2	BL
1- 1	FH-HZA050WRE0	Magnetron thermistor	1	AP
1- 2	QSOCLA011WRE0	Oven lamp socket	1	AH
1- 3	FH-HZA049WRE0	Intake thermistor	1	AL
1- 4	FPWBFA296WRE0	Noise filter [R-2287]	1	AW
1- 4	FPWBFA297WRE0	Noise filter [R-2277]	1	AW
1- 5	QFSHDA019WRE0	Fuse holder	3	AH
1- 6	QACCVA066WRE0	Power supply cord	1	BG
1- 7	DH-HZA009WRK0	Exhaust thermistor	1	AP
* 1- 8	FW-QZA104WRK0	High voltage rectifier assembly	1	BA
		CABINET PARTS		
2- 1	FDAI-A183WRW0	Base plate assembly	1	BC
2- 2	PSHEGA006WRE0	Rubber sheet A	2	AF
2- 3	PSHEGA007WRE0	Rubber sheet B	2	AE
2- 4	GCOVAA250WRW0	Rear cabinet	1	AX
2- 5	FFTASA064WRY0	Oven lamp access cover assembly	1	AN
2-5-1	PCUSU0407WRP0	Cushion	1	AA
2-5-2	PREFHA051WRP0	Lamp reflector	1	AH
2-6	GCABUA523WRP0	Outer case cabinet	1	BA
2-7	PZETEA071WRP0	Cabinet insulation sheet	1	AF
		CONTROL PANEL PARTS		
3- 1	DPWBFB378WRU0	Control unit [R-2277]	1	BP
3- 1	DPWBFB380WRU0	Control unit [R-2287]	1	BP
3- 1A	QCNCMA308DRE0	4-pin connector (A)	1	AC
3- 1B	QCNCMA312DRE0	3-pin connector (B)	1	AB
3- 1C	QCNCMA145DRE0	3-pin connector (D)	1	AB
3- 1D	QCNCMA381DRE0	5-pin connector (E)	1	AD
3- 1E	QCNCMA039DRE0	3-pin connector (H)	1	AB
3- 1F	QCNCMA338DRE0	3-pin connector (J)	1	AB
3- 1G	QLUG-A002PRE0	Tab terminal (TAB1-4)	4	AB
3- 1H	RV-KXA053DRE0	Fluorescent display tube	1	AW
3- 1I	PCUSGA400WRP0	Cushion	2	AC
C1	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C2	RC-EZA192DRE0	Capacitor 1000 uF 35V	1	AD
C3	VCEAB31HW335M	Capacitor 3.3 uF 50V	1	AA
C4	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C5	VCEAB31CW476M	Capacitor 47 uF 16V	1	AA
C6-7	VCKYD11CY103N	Capacitor 0.01 uF 16V	2	AA
C8	VCEAB31CW107M	Capacitor 100 uF 16V	1	AB
C9	VCEAB31EW226M	Capacitor 22 uF 25V	1	AA
C10	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C11	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C12	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB

Note: The parts marked "∆" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
C20	VCEAB31HW104M	Capacitor 0.1 uF 50V	1	AM
C21	VCEAB31VW475M	Capacitor 4.7 uF 35V	1	AA
C30-31	VCEAB31EW226M	Capacitor 22 uF 25V	2	AA
C50	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C60	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C80-81	RC-KZA129DRE0	Capacitor 22 pF 50V	1	AB
C90	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
CF1	RCRS-A010DRE0	Ceramic resonator CST4.00MGW	1	AD
D1-4	VHD11ES1///-1	Diode (11ES1)	4	AB
D5	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D6-7	VHD11ES1///-1	Diode (11ES1)	2	AB
D20	VHD11ES1///-1	Diode (11ES1)	1	AB
D21-23	VHD1SS270A/-1	Diode (1SS270A)	3	AA
D30-33	VHD1SS270A/-1	Diode (1SS270A)	4	AA
D50	VHD1SS270A/-1	Diode (1SS270A)	1	AA
IC1	RH-IZA648DRE0	LSI	1	AV
Q1	VS2SB953-PQ-4	Transistor (2SB953)	1	AG
Q2	VS2SA1561TL-3	Transistor (2SA1561TL)	1	AA
Q10	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
Q20	VSDTA114YS/-3	Transistor (DTA114YS)	1	AB
Q21	VSDTD143ES/-3	Transistor (DTD143ES)	1	AC
Q22-23	VSDTB143ES/-3	Transistor (DTB143ES)	2	AC
Q70	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
R1	VRD-B12EF182J	Resistor 1.8k ohm 1/4W	1	AA
R2	VRD-B12HF561J	Resistor 560 ohm 1/2W	1	AA
R3	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	1	AA
R4	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R5	VRD-B12HF150J	Resistor 15 ohm 1/2W	1	AA
R10	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R20	VRD-B12EF471J	Resistor 470 ohm 1/4W	1	AA
R30-31	VRN-B12EK202F	Resistor 2k ohm 1/4W [R-2277]	2	AA
R30-31	VRN-B12EK152F	Resistor 1.5k ohm 1/4W [R-2287]	2	AA
R32-33	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	2	AA
R34-35	VRD-B12EF304J	Resistor 300k ohm 1/4W	2	AA
R36-37	VRD-B12EF473J	Resistor 47k ohm 1/4W	2	AA
R40	VRD-B12EF112J	Resistor 1.1k ohm 1/4W	1	AA
R41	VRD-B12EF203J	Resistor 20k ohm 1/4W	1	AA
R42	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R50	VRD-B12EF101J	Resistor 100 ohm 1/4W	1	AA
R51	VRD-B12EF512J	Resistor 5.1k ohm 1/4W	1	AA
R63	VRD-B12EF473J	Resistor 47k ohm 1/4W	1	AA
R65	VRD-B12EF152J	Resistor 1.5k ohm 1/4W	1	AA
R70	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R80-81	VRD-B12EF224J	Resistor 220k ohm 1/4W	2	AA
R82-83	VRD-B12EF472J	Resistor 4.7k ohm 1/4W	1	AA
R84-85	VRD-B12EF153J	Resistor 15k ohm 1/4W	2	AA
R90	VRD-B12EF472J	Resistor 4.7k ohm 1/4W	1	AA
R91	VRD-B12EF682J	Resistor 6.8k ohm 1/4W	1	AA
RY1	RRLY-A078DRE0	Relay (OJ-SH-118LM)	1	AG
RY2-3	RRLY-A087DRE0	Relay (VS18MB-NR)	2	AN
SP1	RALM-A007DRE0	Buzzer (PKM22EPT-CA)	1	AF
T1	RTRNPA080DRE0	Touch control transformer	1	AU
CT1-2	RTRN-A060DRE0	Current transformer	2	AH
VRS1	RH-VZA034DRE0	Varistor (10G471K)	1	AD
ZD1	VHEHZ12C1//-1	Zener diode (HZ12C1)	1	AA
ZD2	VHEHZ4C3///-1	Zener diode (HZ4C-3)	1	AA
3- 2	FPNLCB059WRK0	Control panel frame with key unit assembly	1	BE
3- 2-1	GMADIA067WRF0	Display window	1	AE
3- 2-2	HDECAA196WRP0	Decorative metal fittings	1	AS
3- 2-3	HPNLCB155WRF0	Control panel	1	BA
3- 3	LANGTA243WRW0	Control panel mounting angle	1	AF
3- 4	XEPSD30P10XS0	Screw; control unit mounting	11	AA
3- 5	XEPSD40P12000	Screw; control panel mounting angle mounting	1	AA
3- 6	XFPSD40P08K00	Screw; decoration panel mounting for earth	1	AA
3- 7	PCUSUA303WRE0	Water-proof cushion	1	AA
3- 8	JKNBKA510WRM0	Knob	1	AE
3- 9	LANGTA304WRP0	Rotary encoder mounting plate	1	AD
3- 10	RVR-BA016WRK0	Rotary encoder	1	AY
3- 11	JBTN-A895WRM0	Select button	4	AE
3- 12	JBTN-A896WRM0	Start button	1	AE
3- 13	DPWBFB195WRU0	Switch unit assembly	1	AP
3- 13-1	FW-VZA165DRE0	Lead wire harness (2-pin)	1	AF

Note: The parts marked "Δ" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.

	REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
	3- 13-2	FW-VZA166DRE0	Lead wire harness (5-pin)	1	AH
	3- 13-3	QSW-PA025DRE0	Tact switch (SW1-SW5)	5	AD
	3- 14	PCUSUA404WRP0	Select cushion	4	AC
	3- 15	PCUSGA401WRP0	Cushion	1	AD
	3- 16	MSPRPA082WRE0	Spring	1	AD
	3- 17	PCUSUA407WRP0	Water proof cushion B	1	AB
	3- 18	PCUSUA408WRP0	Water proof cushion C	1	AC
	3- 19	PCUSUA406WRP0	Water proof cushion A	1	AB
	3- 20	PSHEGA005WRP0	Water proof sheet	1	AE
	3- 21	QW-VZA122WRE0	Earth wire	1	AC
	3- 22	XEPSD30P08XS0	Screw; 4mm x 8mm	2	AA

OVEN PARTS

	4- 1	PCUSUA265WRP0	Cusshion	1	AA
	4- 2	FDUC-A271WRK0	Exhaust duct assembly	1	AM
Δ	4- 3	FOVN-A336WRY0	Oven cavity	1	BR
	4- 4	PFILWA053WRP0	Oven light screen	1	AE
	4- 5	MLEVPA153WRF0	Switch lever A	1	AC
	4- 6	MLEVPA154WRF0	Switch lever B	1	AC
	4- 7	MLEVPA155WRF0	Switch lever C	1	AC
	4- 8	MSPRCA075WRE0	Switch spring A	1	AB
	4- 9	MSPRCA076WRE0	Switch spring B	2	AB
Δ	4-10	PHOK-A081WRF0	Latch hook	1	AP
	4-11	PZETEA047WRP0	Switch insulator	1	AC
	4-12	PDUC-A566WRF0	Mg air guide	1	AN
	4-13	PDUC-A567WRF0	Mg air guide cover	1	AN
	4-14	FGLSPA061WRY0	Ceramic shelf	1	BE
	4-15	FPLT-A004WRY0	Stirrer antenna upper assembly	1	AX
	4-16	FPLT-A005WRY0	Stirrer antenna lower assembly	1	AY
	4-17	LANGKA762WRP0	Partition angle R	1	AE
	4-18	LANGQA370WRP0	Oven lamp mounting plate	1	AD
	4-19	LBNDKA075WRP0	Capacitor holder	1	AD
	4-20	PGIDHA054WRW0	Water-proof cover	1	AF
	4-21	NSFTPA031WRF0	Antenna motor shaft	2	AH
	4-22	PCOVPA310WRF0	Splash cover	1	AZ
	4-23	PCUSGA405WRP0	Cushion	1	AF
	4-24	PCUSGA409WRP0	Cushion	1	AE
	4-25	PCUSUA413WRP0	Cushion	2	AG
	4-26	PCUSUA415WRP0	Cushion	2	AC
	4-27	PCUSUA416WRP0	Cushion	2	AC
	4-28	PDUC-A607WRW0	Mg exhaust duct	1	AP
	4-29	PCUSUA414WRP0	Cushion	1	AD
	4-30	LANGQA251WRW0	Noise filter angle	1	AF
	4-31	LANGQ0382WRM0	Earth angle	1	AB
	4-32	LANGFA172WRP0	Chassis support	1	AH
	4-33	LBSHC0006YBE0	Cord bushing	1	AD
	4-34	PCUSGA441WRP0	Cuhion	1	AL
	4-35	FFIL-A003WRK0	Air intake filter assembly	1	AV
	4-36	HDECEA001WRP0	Decoration sash	1	AR
	4-37	HDECQA146WRM0	Corner cap left	1	AE
	4-38	HDECQA147WRM0	Corner cap right	1	AE
	4-39	LANGKA679WRM0	Fixing angle s	1	AD
Δ	4-40	MHNG-A215WRM0	Upper oven hinge	1	AG
Δ	4-41	MHNG-A216WRM0	Lower oven hinge	1	AG
	4-42	PCUSUA448WRP0	Cushion	1	AC
	4-43	PCUSUA417WRP0	Cushion	1	AB
	4-44	PCUSUA268WRP0	Cushion	1	AA
	4-45	PCUSUA447WRP0	Cushion	1	AC
	4-46	MSPRCA101WRE0	Switch spring C	1	AC

DOOR PARTS

Δ	5	DDORFA746WRK0	Door assembly	1	BP
Δ	5- 1	FDORFA289WRT0	Door panel assembly	1	BH
	5- 2	GCOVAA242WRY0	Door case	1	BD
	5- 3	FHNDMA011WRY0	Door lever assembly	1	AP
	5- 4	GCOVHA350WRF0	Choke cover	1	AR
	5- 5	JHNDPA169WRM0	Door handle	1	AU
	5- 6	LANGKA766WRP0	Outside window fixing plate	2	AF
	5- 7	PCUSGA430WRP0	Cushion	2	AM
	5- 8	PGLSPA457WRE0	Door glass	1	AV
	5- 9	PPACGA142WRP0	Door case packing	2	AF
	5-10	PSHEPA520WRE0	Sealer film	1	AH

Note: The parts marked "∆" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
5-11	XCPSD40P12000	Screw : 4mm x 12mm	2	AA
5-12	XFPSD40P08K00	Screw : 4mm x 8mm	3	AA
5-13	XHTSD40P08RV0	Screw : 4mm x 8mm	4	AA
5-14	FANGKA200WRY0	Latch fixing angle	1	AQ
5-15	FLEVFA019WRY0	Joint lever	1	AP
∆ 5-16	LSTPCA002WRM0	Latch head	2	AM
5-17	MLEVPA220WRF0	Head lever	1	AM
5-18	MSPRCA097WRE0	Latch spring	1	AG
5-19	HBDGCA070WRE0	Door badge [R-2287]	1	AF
5-19	HBDGCA071WRE0	Door badge [R-2277]	1	AF
5-20	LANGKA768WRP0	Fixing plate upper	1	AH

MISCELLANEOUS

6- 1	TINSMA005WRR0	Instruction manual	1	AH
6- 2	TLABHA019WRR0	Memory sticker	1	AD
6- 3	FW-VZB402WRE0	Switch harness	1	AG
6- 4	FW-VZB416WRE0	Main wire harness	1	BB
6- 5	LHLDWA023WRE0	Wire saddle	1	AB
6- 6	LHLDWA027WRE0	Wire saddle S	1	AC
6- 7	LHLDWA040WRE0	Wire holder A	1	AB
6- 8	TLABSA054WRR0	Fuse label [R-2287]	2	AB
6- 8	TLABS0057WRR0	Fuse label M6.3A [R-2277]	2	AA
6- 9	LHLDWA029WRE0	Cord holder	2	AB
6-10	TCAUHA082WRR0	Caution label	1	AC
6-11	TCAUHA083WRR0	Belgium label	1	AB
6-12	TCAUHA176WRR0	Caution label	1	AC
6-13	TSPCNC157WRR0	Rating label [R-2287]	1	AH
6-13	TSPCNC164WRR0	Rating label [R-2277]	1	AH
6-14	TLABSA008WRR0	Fuse label F6.3A	1	AA
6-15	TLABSA064WRR0	A017 label [R-2287]	1	AC
6-15	TLABSA065WRR0	BS13 label [R-2277]	1	AC
6-16	LHLDWQ005YBE0	Purse lock	1	AA

SCRE,NUTS AND WASHERS

7- 1	XCBWW30P08000	Screw : 3mm x 8mm	4	AB
7- 2	XBPSD50P12KS0	Screw : 5mm x 12mm	4	AA
7- 3	XFTSD40P08TV0	Screw : 4mm x 8mm	3	AA
7- 4	XOTSD40P06000	Screw : 4mm x 6mm	3	AA
7- 5	XBPBW40P08M00	Screw : 4mm x 8mm	1	AA
7- 6	LX-BZA048WRE0	Special screw	1	AA
7- 7	LX-WZA035WRE0	Special washer	1	AB
7- 8	XWWSD40-10000	Washer : 4mm x 1mm	1	AA
7- 9	LX-CZA038WRE0	Special screw	2	AA
7-10	LX-EZA004WRE0	Special screw	2	AA
7-11	XFTWW40P12000	Screw : 4mm x 12mm	1	AB
7-12	XCBWW30P12000	Screw : 3mm x 12mm	1	AB
7-13	XCPSD30P06X00	Screw : 3mm x 6mm	1	AA
7-14	LX-CZA057WRE0	Special screw	2	AB
7-15	XHPSD40P05000	Screw : 4mm x 5mm	2	AA
7-16	XHTSD40P08RV0	Screw : 4mm x 8mm	6	AA
7-17	XOTSD40P12000	Screw : 4mm x 12mm	9	AA
7-18	XOTWW40P10000	Screw : 4mm x 10mm	18	AA
7-19	XOTWW40P20000	Screw : 4mm x 20mm	1	AA
7-20	XCPSD30P10000	Screw : 3mm x 10mm	3	AA
7-21	XFPSD40P08K00	Screw : 4mm x 8mm	2	AA
7-22	XOTSD40P12RV0	Screw : 4mm x 12mm	1	AA
7-23	LX-BZA064WRE0	Special screw	1	AA
7-24	XCPSD30P06000	Screw : 3mm x 6mm	3	AA
7-25	XOTSD40P10000	Screw : 4mm x 10mm	2	AA
7-26	XBPUW40P04000	Screw : 4mm x 4mm	2	AB
7-27	XBTUW40P10000	Screw : 4mm x 10mm	2	AA
7-28	XFTSD40P08000	Screw : 4mm x 8mm	1	AA
7-29	XTPSD40P08000	Screw : 4mm x 8mm	2	AA
7-30	XWWSD50-06000	Washer : 5mm x 0.6mm	2	AA
7-31	XONSC40P10000	Screw : 4mm x 10mm	1	AA
7-32	LX-BZA110WRE0	Special screw	4	AC
7-33	XUBWW40P30000	Screw : 4mm x 30mm	1	AB
7-34	XBPSD30P28K00	Screw : 3mm x 28mm	1	AA
7-35	XNESD30-24000	Nut : 3mm x 2.4mm	1	AA

Note: The parts marked "Δ" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.

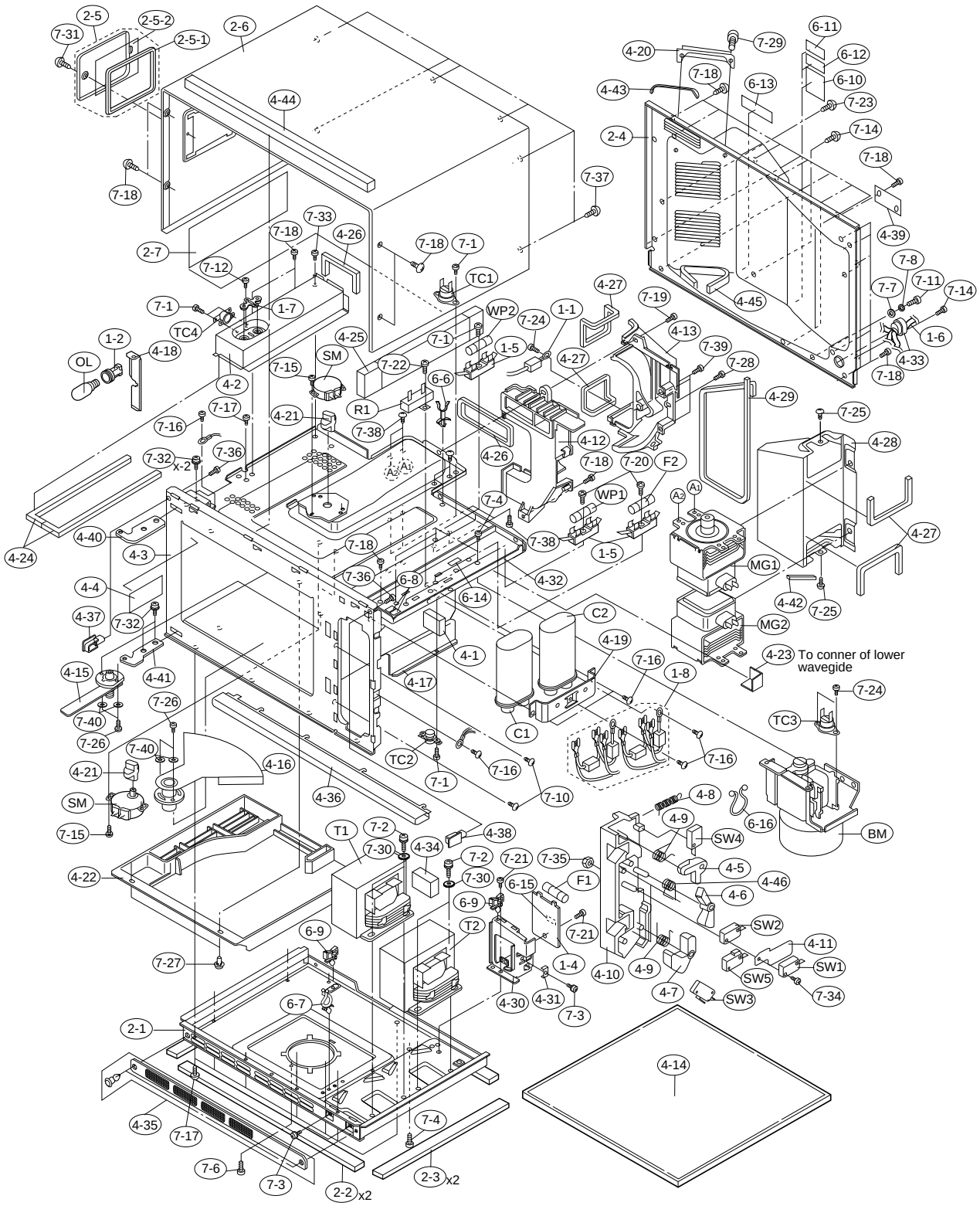
REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
7-36	XJPSD40P10000	Screw : 4mm x 10mm	2	AA
7-37	XOTSC40P12000	Screw : 4mm x 12mm	2	AA
7-38	XHPSD50P08000	Screw : 5mm x 8mm	1	AB
7-39	XEPSD30P12XS0	Screw : 3mm x 12mm	3	AB
7-40	PSPA-A101WRE0	Washer	4	AB

HOW TO ORDER REPLACEMENT PARTS

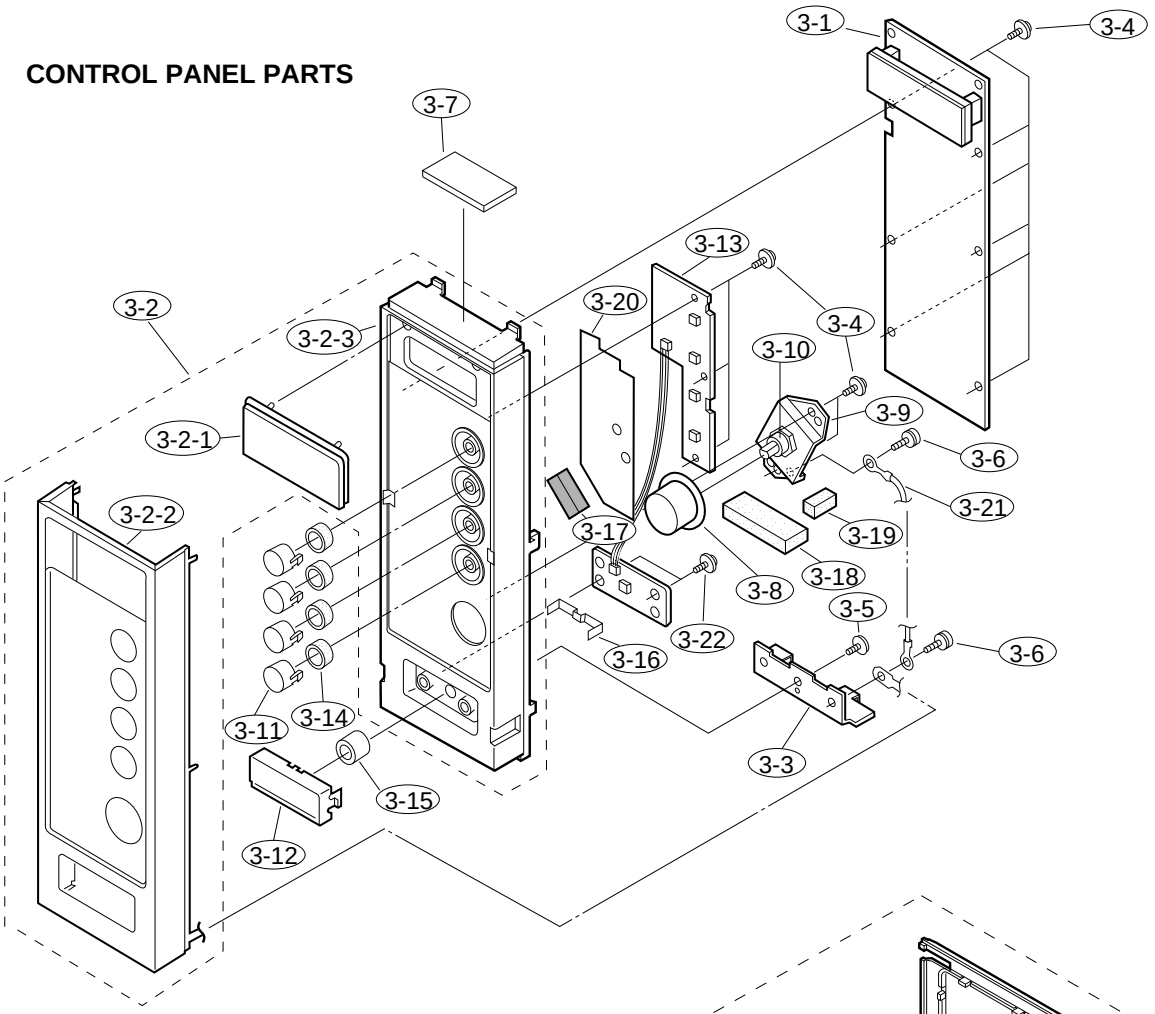
To have your order filled promptly and correctly, please furnish the following information.

1. MODEL NUMBER 2. REF. NO.
3. PART NO. 4.DESCRIPTION

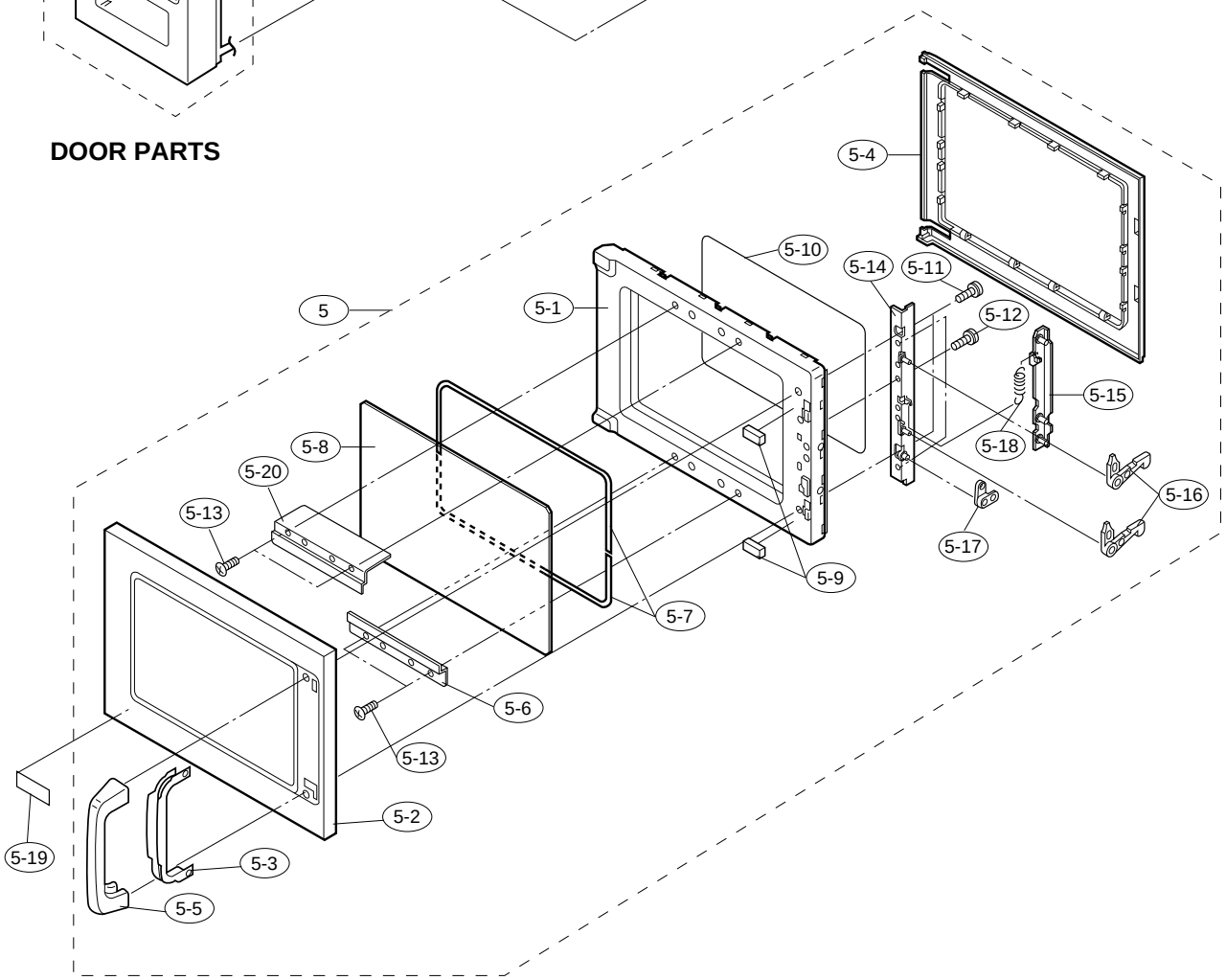
OVEN AND CABINET PARTS

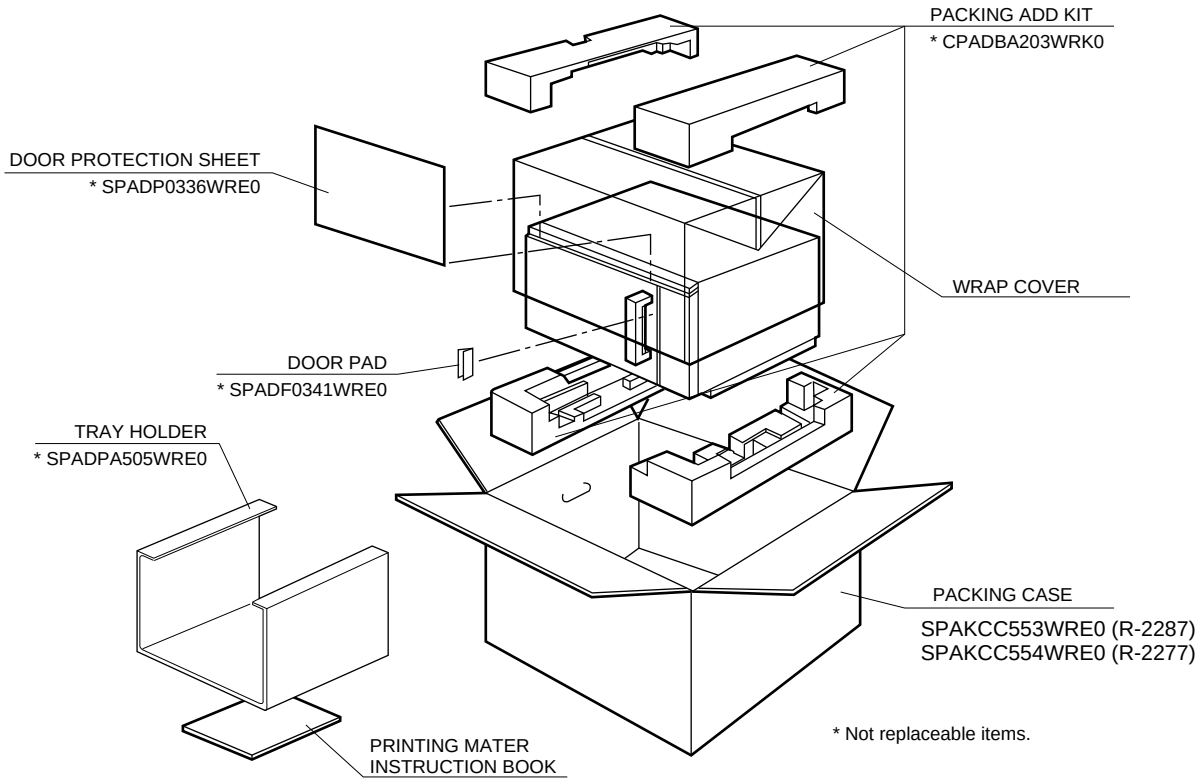


CONTROL PANEL PARTS



DOOR PARTS





* Not replaceable items.